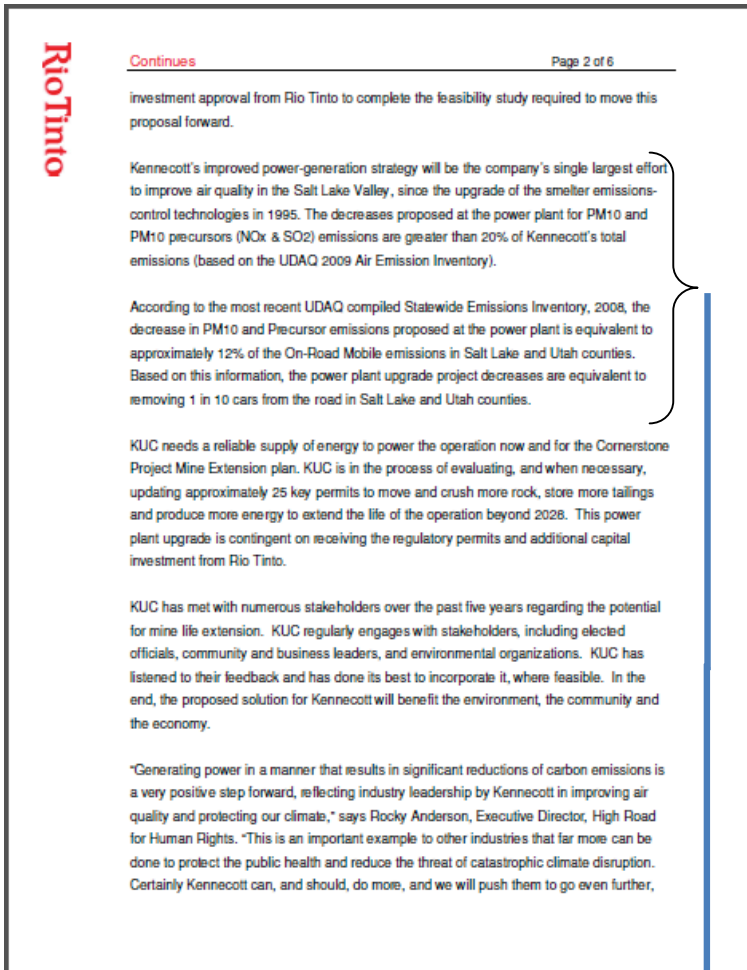


Calculations supporting Power Plant Upgrade Press Release

On December, 15, 2010, Kennecott Utah Copper announced a proposed plan to improve air quality in the Salt Lake Valley by upgrading our Power Plant to a high-efficiency natural gas system. Raw footage of that press conference is located [here](#). We are committed to improving Utah's air quality, and as part of that, believe it's important to share the calculation basis for information communicated in our press release.

As stated in [the December 2010 news release](#),



"Kennecott's improved power-generation strategy will be the company's single largest effort to improve air quality in the Salt Lake Valley, since the upgrade of the smelter emissions control technologies in 1995. The decreases proposed at the power plant for PM₁₀ and PM₁₀ precursors (NO_x & SO₂) emissions are greater than 20% of Kennecott's total emissions (based on the UDAQ 2009 Air Emission Inventory).

"According to the most recent UDAQ compiled Statewide Emissions Inventory, 2008, the decrease in PM₁₀ and Precursor emissions proposed at the power plant is equivalent to approximately 12% of the On-Road Mobile emissions in Salt Lake and Utah counties. Based on this information, the power plant upgrade project decreases are equivalent to removing 1 in 10 cars from the road in Salt Lake and Utah counties."

How did we calculate PM₁₀ and PM₁₀ precursor emission reductions from the power plant project equivalent to approximately 12% of the On-Road Mobile emissions in Salt Lake and Utah counties?

Note: This emission reduction is based on replacement of the 3 coal units with the high efficiency natural gas system

1. If you look at the [2008 State Summary of Emissions by Source](#) document provided by DAQ, you can see the contribution of On Road Mobile sources; this data was last updated in November 2011. You can calculate the total PM₁₀ and precursor emissions from On Road Mobile Sources in Salt Lake and Utah counties by adding PM₁₀, NO_x, and SO_x, as shown below.

Note: Although the list below identifies SO_x, as a criteria pollutant, Kennecott reports SO₂ for air emissions inventory purposes separate from SO₃ and other sulfur oxides.

2008 State Summary of Emissions by Source (tons/year)

County	Source	CO	NOx	PM10	PM2.5	SOx	VOC
Salt Lake	Area Source	2,660.62	2,575.67	5,565.25	1,621.62	126.34	15,196.96
	Non-Road Mobile	54,393.21	6,062.80	415.33	394.06	288.55	4,560.12
	On-Road Mobile	122,156.78	11,514.46	7,221.08	233.55	77.78	8,447.05
	Point Source	5,032.83	10,842.71	4,527.05	1,487.60	5,622.04	2,283.82
	Biogenics	1,754.02	0.00	0.00	0.00	0.00	11,341.57
	Wildfires	181.64	5.17	21.98	19.78	0.00	31.03
	Total	186,179.10	31,000.81	17,750.68	3,756.61	6,314.71	41,860.54

$$11,514.46 + 7,221.08 + 77.78 = 18,813.$$

Utah	Area Source	2,898.68	1,053.42	5,208.59	1,386.81	83.60	7,326.07
	Non-Road Mobile	16,991.70	2,666.97	207.85	197.18	106.31	1,758.89
	On-Road Mobile	57,284.55	7,079.98	4,106.23	254.35	34.29	3,849.59
	Point Source	427.52	836.51	627.40	224.52	181.78	608.26
	Biogenics	3,018.72	0.00	0.00	0.00	0.00	19,540.86
	Wildfires	283.25	8.06	34.27	30.84	0.00	48.38
	Total	80,904.42	11,544.94	10,184.34	2,093.70	405.98	33,132.05

$$7,079.98 + 4,106.23 + 34.29 = 11,220.50$$

Now we know the two sums, let's add them together to get the total contribution of On Road Mobile sources to PM₁₀ and precursors of Salt Lake and Utah counties; 18,813.32 + 11,220.50 = **30,033.82 tons/year**

2. We can now look at the proposed actual emission changes listed in the [Approval Order Abstract](#) to determine how the repowering of the power plant equates to approximately 12% of the On-Road Mobile emissions in Salt Lake and Utah counties.

Using the total PM₁₀ and precursor emissions for On Road Mobile sources in Salt Lake and Utah counties, 30,033.82 tons/year, we can calculate the percentage that the repowering emission reductions will equate to.

We first have to state the total PM₁₀ and precursors that will be reduced after the repower as stated in the [Approval Order Abstract](#) on pg. 3.

Abstract

On December 15, 2010 Kennecott Utah Copper, LLC (KUC) submitted a NOI to install and operate a new combined-cycle, natural gas-fired combustion turbine (CT) to replace three existing coal-fired boilers (identified as Units 1, 2 and 3 boilers). The new CT will have a nominal generating capacity of approximately 275 megawatts (MW) and will limit emissions through a combination of dry low-NO_x combustors, selective catalytic reduction (SCR) and catalytic oxidation (CatOx). The CT will be located at KUC's existing power plant in Salt Lake County. Salt Lake County is a non-attainment area of the NAAQS for PM₁₀, PM_{2.5} (a subset of PM₁₀) and SO₂, and is a maintenance area for ozone. Title V of the 1990 Clean Air Act applies to this source and this modification will result in a Title V amendment. The requirements for Title V shall be followed until the operating permit for this source has been amended. Current potential to emit for the facility are estimated at: PM₁₀ = 256; PM_{2.5} = 256; NO_x = 4,160; SO₂ = 6,522; CO = 384; and VOC = 33. Using a two-year average of KUC's actual emissions from Units 1, 2 and 3 boilers as a baseline, the change in emissions from this project, in TPY, is as follows: PM₁₀-100; PM_{2.5}-20; NO_x-1,543; SO₂-1,961; CO +93; VOC +19 and GHG (CO₂e) +278,703. The facility-wide potential to emit totals following the installation of the new CT and after the shut-down of Units 1, 2 and 3 boilers are as follows (again in TPY): PM₁₀ = 248, PM_{2.5} = 248, NO_x = 1,641, SO₂ = 2,577, CO = 328, VOC = 41 and total HAPs = 9. Potential GHG emissions for the new CT are estimated to be 1,162,552 TPY (expressed as CO₂e). While classified as a minor modification for the criteria pollutants listed above, this project represents a major modification for GHG emissions.

This air quality AO authorizes the project with the following conditions and failure to comply with any of the conditions may constitute a violation of this order. This AO is issued to, and applies to the following:

Name of Permittee:	Permitted Location:
Kennecott Utah Copper LLC 4700 Daybreak Parkway South Jordan, UT 84095	Power Plant/ Lab/ Tailings Impoundment 9600 West 2100 South Magna, UT 84044-6001

UTM coordinates: 405000 m Easting, 4507000 m Northing, UTM Zone 12
SIC code: 4911 (Electric Services)

Section I: GENERAL PROVISIONS

L.1 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]

L.2 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]

L.3 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]

L.4 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request, and the records shall include the two-year period prior to the date of

UPP Repower	SO ₂	1,961
UPP Repower	NO _x	1,543
UPP Repower	PM ₁₀	100

Total reductions of PM₁₀ +precursors = **3,604 tons/year**

Now, that we have the total (3,604 tons/year) we must divide that by the total PM10 and precursors that we calculated from On Road Mobile sources in Salt Lake and Utah counties (30,033.82 tons/year).

$$3,604 \div 30,033.82 = 0.1199981$$

To find the percentage, we must multiply this by 100.

$$0.1199981 \times 100 = 11.99, \text{ or } \mathbf{12\%}$$

In conclusion, the repowering of the power plant is equivalent to reducing **approximately 12%** of the On Road Mobile source emissions in Salt Lake and Utah counties.

The analogy stated in the press release of emission decreases equivalent to removing 1 in 10 cars from the road was based on this 12% reduction in PM₁₀ and PM₁₀ precursor (NO_x and SO₂) emissions from on road mobile sources in Salt Lake and Utah Counties.

So, how did we calculate that the decreases proposed at the power plant for PM₁₀ and PM₁₀ Precursors (NO_x & SO₂) emissions are greater than 20% of Kennecott's total emissions?

In order to determine this, emissions from all Kennecott Utah Copper facilities must be added together for PM₁₀, SO₂, and NO_x. In the 2008 Annual Emissions from Point Sources by County, you can see Kennecott's sources under the Salt Lake County emissions.

2008 Annual Emissions from Point Sources by County

County	Site ID	Name	Emissions (tons/year)					
			CO	NOX	PM10-PRI	PM25-PRI	SOX	VOC
Salt Lake	12776	Geneva Rock Products: Mount Jordan Operations	2.82	9.32	217.95	30.76	1.97	1.12
	10565	Geneva Rock Products: Point of the Mountain (Hansen-Lehi) Facility	58.26	102.12	68.07	11.31	14.14	18.61
	11792	G-L Industries, Inc.: Laminated Wood Beam Manufacturing Plant						5.95
	10407	Granite Construction Company: Cottonwood Facility	52.74	65.95	23.43	5.20	3.38	14.94
	14032	Granite Mill & Fixture Company: Custom Millwork						3.50
	11891	Graphic Packaging International, LLC.: Salt Lake City Bag Manufacturing Plant	2.84	3.12	0.15	0.15	0.01	13.58
	10580	Hallmark Cabinet Company: Wood Cabinet and Furniture Manufacturing Plant	0.26	0.30	0.09	0.03	0.00	6.84
	12088	Hanson Structural Precast Eagle: Precast/Prestress Concrete Manufacturing Facility	4.19	9.43	13.03	2.27	0.79	2.23
	12394	Harman Music: Audio Components Manufacturing	0.20	0.24	0.02	0.02		1.98
	13102	Harper Contracting, Inc.: Daybreak Aggregate & Concrete Plant	10.62	30.04	6.82	6.87	2.60	3.54
	11481	Harper Contracting: Pit #16 Parley's Canyon	14.34	60.64	14.32	2.85	4.45	3.24
	11557	Harper Contracting: Pit #5 - Salt Lake County	0.91	2.99	3.70	0.51	0.29	0.48
	10569	Harper-Kilgore, LLC: Pit #10	53.72	42.52	23.45	2.24	6.65	18.00
	11386	Hexcel Corporation: Salt Lake Operations	38.79	102.08	38.91	19.98	10.51	68.89
	14008	HK Systems: Automated Storage & Retrieval Machine Mfg						2.36
	10426	Hudson Printing Company: Hudson Printing	4.15	4.38	3.45	1.77	0.01	5.95
	10440	IASIS Healthcare: Salt Lake Regional Medical Center	2.42	6.16	0.29	0.29	1.86	0.25
	11644	ICU Medical, Inc.: Salt Lake Medical Products Manufacturing	1.26	1.50	0.11	0.03	0.01	6.85
	10477	Intercon Incorporated: Wood Furniture Mfg. Facility	0.09	0.10	0.01	0.01		7.60
	13308	Intermountain Health Care: Intermountain Medical Center - Murray	11.60	6.90	1.04	1.04	0.83	0.36
	10405	Intermountain Health Care: TOSH - The Orthopedic Specialty Hospital	2.17	1.29	0.20	0.20	0.02	0.07
	11150	Interstate Brands West Corporation: Interstate Brands Company - Salt Lake	1.48	1.70	0.13	0.13	0.01	3.14
	10423	Interstate Brick Company: Brick Manufacturing Plant	68.55	33.52	25.81	2.84	10.72	3.03
	11583	Jack B. Parsons Company: California Ready Mix Facility - Directors Row	0.84	2.12	2.65	1.33	0.20	0.28
	12224	Jack's Tire and Oil Incorporated: Tire Retreading Facility - Salt Lake City	0.26	0.31	1.68	0.02	0.00	1.44
	10501	Kennecott Bameys Canyon Mining Company: Bameys Canyon Mine	0.34	1.69	0.09	0.09	0.05	0.06
	10346	Kennecott Utah Copper Corporation: Smelter & Refinery	109.75	154.25	185.06	149.52	970.08	8.66
	10571	Kennecott Utah Copper LLC: Mine & Copperton Concentrator	2,021.56	4,845.85	2,914.70	737.65	2.79	446.27
	10572	Kennecott Utah Copper LLC: Power Plant/ Lab/ Tailings Impoundment	135.46	2,555.18	109.30	38.90	3,144.97	14.72
	10350	Kenworth Truck Company: Salt Lake City Company Station	12.00	32.60	5.80	5.00	3.50	10.00
	10439	Lakeview Rook Products: North Salt Lake Pit	15.75	53.66	17.30	6.56	5.56	6.04
	10449	LDS Church Printing Center: Salt Lake Printing Center - LDS Church	1.54	1.81	15.05	7.59	0.01	5.70
	10578	LDS Church: LDS Central Heating Plant	9.95	11.84	0.90	0.90	0.07	0.65
	10347	LDS Hospital: LDS Hospital	6.60	3.86	0.58	0.06	0.04	0.20
	13091	Linde Hydrogen Plant: Hydrogen Gas Production	8.10	19.40	4.40	4.40	0.30	10.40
	10443	Maaaco Auto Painting & Bodyworks: Sandy Automobile Body Repair and Painting Facility	0.00	0.00	0.00	0.00	0.00	2.68
	13306	Masrotech Polyseal: Seals Manufacturer						7.72
	11392	Mark Steel Corporation: Jordan Steel Equipment Manufacturing Plant	7.01	1.17	0.12		0.08	0.03
	12740	Marko Foam Products: Packaging & Other Foam Products Manufacturing	1.07	1.25	0.09	0.09	0.01	15.30
	13060	Masoo Retail Cabinet Group LLC: Cabinet Manufacturing Plant	4.56	5.28	0.39		0.03	8.29
	10380	Materials Packaging Corporation: Dry Mix Cement Plant	3.36	5.91	12.10	5.86	0.32	0.52
	11199	Midwestern Fabricators, LLC: Fiberglass Manufacturing Plant						0.47
	10557	Moog Salt Lake Operations	0.15	0.37	0.04	0.04	0.02	16.92
	10350	Mountain Cement Company: Shipping Terminal			3.33			
	10348	Murray City Power Department: Electrical Generation Plant	11.40	7.19	0.92	0.92	0.05	0.30
	13150	Newspaper Agency Corp (MediaOne): 4770 South 5600 West	0.80	0.95	0.07	0.07	0.01	7.23
	10512	O.C. Tanner Company: O.C. Tanner Manufacturing Facility	0.10	0.78	0.01			1.77
	10662	Olympia Sales Company: Cabinet Manufacturing Facility	0.27	0.32	7.86	4.28	0.00	20.87
10033	Owens Corning: Western Fiberglass - Salt Lake City Plant	11.25	1.42	23.21	21.35	1.03	3.86	
10355	PacificCorp: Gadsby Power Plant	130.02	184.66	30.83	21.56	1.95	11.72	
11240	Penco Products: Salt Lake Plant	0.28	1.33	0.20	0.17	0.01	0.56	
10481	Primary Children's Medical Center: Primary Children's Medical Center	15.40	14.56	1.20		0.76	1.55	

revised: 11/22/2010

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	PM ₁₀ (tons/year)	SO _x (tons/year)	NO _x (tons/year)	Total (tons/year)
Smelter and Refinery	185.06	970.08	154.25	1,309.39
Mine and Concentrator	2,914.70	2.79	4,845.85	7,763.34
Power Plant, Lab, Tailings	109.30	3,144.97	2,555.18	5,809.45
Total	3,209.06	4,117.84	7,255.28	14,882.18

Total emissions of PM₁₀ and precursors from Kennecott Utah Copper = **14,882.18** tons per year.

To calculate the percentage of Kennecott's total emissions that the repowering project would reduce, you must divide total PM₁₀ and precursors that will be reduced after the repower from step 2 above (3,604 tons per year) by the total PM₁₀ and precursors from Kennecott (14,882.18 tons per year) = 0.242

To find the percentage of 0.242, you must multiply it by 100. Therefore, the percent reduction of total Kennecott PM₁₀ and PM₁₀ precursor emissions from the power plant project = 24.21% or **greater than 20%**