

Appendix G
Draft Air Quality

**ARIZONA EASTERN RAILWAY
DRAFT AIR QUALITY SECTION**

Kleinfelder Project No.: 76590 (1)

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October 30, 2007
File No. 76590 (1)

Mr. John Cook
CirclePoint
135 Main Street, Suite 1600
San Francisco, California 94105

SUBJECT: Preliminary Analysis of Emissions from Heavy Duty Diesel Vehicles and Locomotive Engines (REV 1) Miami to Safford, Arizona

Dear Mr. Cook:

Per your request, Kleinfelder has completed a preliminary analysis of emissions from heavy duty diesel vehicles (HDDV) and locomotive engines for the travel distance between Miami, Arizona, and the Phelps Dodge Mine near Safford, Arizona.

Preliminary Findings

The following table summarizes our preliminary findings.

Preliminary Analysis of Emissions from Heavy-Duty Diesel Vehicles (HDDV) and Locomotive-based Transport (tons/year)

Vehicle Type	Emission Source	PM10	VOC	CO	NOx	SOx
HDDV	Tailpipe	1.92	2.36	14.26	96.09	1.66
	Fugitive ¹	219.30	---	---	---	---
	Total	221.22	2.36	14.26	96.09	1.66
Locomotives	Tailpipe (Total)	4.04	6.04	16.05	162.95	---

¹ = Fugitive paved road emissions
 --- = Not applicable or not enough information available
 PM10 = Particulate matter less than 10 micrometers in diameter
 VOC = Volatile organic compounds
 CO = Carbon monoxide
 NOx = Nitrogen oxides
 SOx = Sulfur oxides

Assumptions

Our preliminary findings are based on the following assumptions:

- One-way travel distance for both modes of transportation is 93.75 miles;
- One round-trip per day (187.5 miles);
- HDDV route includes 83.8 miles of “non-inspection/maintenance area rural principal arterial” roadways and 9.95 miles of “non-inspection/maintenance area rural local” roadways;
- HDDV transport includes 40 tanker trucks and 40 freighter (van/box) trucks;
- Locomotive transport includes 2 line-haul engines;
- Both HDDV and locomotive transport occurs 365 days per year;
- Locomotive fuel mileage is 4 gallons per mile (Arizona Eastern Rail);
- Topography of travel route has no impact on fuel economy or emissions;
- HDDV tailpipe emissions are based on HDDV emission factors from 2005 Mobile 6.2.03;
- HDDV fugitive paved road emissions are based on the equation in AP-42 Section 13.2.1 with the following assumptions:
 - Precipitation data from Western Regional Climate Center for Globe, Arizona, from 1981 to 2006;
 - Average payload and loaded weights of 5-axle tractor-semitrailer from the United States Department of Transportation (USDOT) *Comprehensive Truck Size and Weight Study*
 - Tank body – 23.5 tons (payload weight) & 38 tons (loaded weight)
 - Van (box) – 15.5 tons (payload weight) & 31 tons (loaded weight)
 - Average daily traffic (ADT) between 500 and 5,000 vehicles; and
- Locomotive tailpipe emissions are based on uncontrolled emission factors for line-haul locomotives presented in the United States Environmental Protection Agency’s (EPA) *Technical Highlights - Emission Factors for Locomotives*, dated December 1997.

Limitations

The recommendations provided in this letter are based on our present knowledge of the project goals and requirements. If the project goals and requirements differ from those described herein, we should be notified immediately so that any necessary modifications or supplemental recommendations may be provided.

This letter was prepared in accordance with generally accepted engineering practice, as it exists in the project area at the time of our study. No warranty, either expressed or implied, is made. The findings provided in this letter are based on assumptions derived from referenced documents and correspondence with the Client. The consistency of these assumptions with the overall project goals and the scope of work should be verified. Kleinfelder should be notified immediately if inconsistencies are found, as revisions to our assumptions and findings might be necessary.

This letter may be used only by the Client and only for the project and the purposes stated within a reasonable time from its issuance. If it is desired to use the information in this letter later than one year after the report date, Kleinfelder should be contacted to evaluate if technology or conditions have changed necessitating an update of the letter. Non-compliance with any of these requirements will release Kleinfelder from any liability resulting from the use of this letter by any unauthorized party.

If you have any questions regarding the above information or would like to discuss additional work related to this project, please contact me at (480) 763-1200.

Sincerely,

KLEINFELDER WEST, INC.



Darcy J. Anderson
Environmental Group Manager

DJA:wcc

Text from proposal:

The Air Quality section of the environmental assessment will provide information on the affected environment, including descriptions of air quality, climatology and meteorology in the Safford, Arizona area. The methodology for determining potential air quality impacts will include determination of acceptable Environmental Protection Agency (EPA) emissions factors (e.g. from the AP-42 manual) to estimate emissions of particulate matter (PM₁₀ and PM_{2.5}) and other criteria pollutants (e.g. SO₂) from both the construction and operations phases. Construction-related emissions will include off-road diesel equipment operation, grading, etc. Operations-related emissions will include diesel locomotive operations, based on one train round-trip per day. To assess the air quality impacts, the estimated emissions of air pollutants will be calculated, including cumulative impacts to the year 2030. The assessment will also list applicable local, state and federal air quality requirements, including transportation conformity. Depending on the level of calculated operations-related emissions, a screening level modeling analysis may be necessary to further evaluate the impacts in terms of pollutant concentrations to show that impact will not exceed ambient air quality standards.

CLIMATOLOGY AND METEOROLOGY

The Safford, Arizona area is temperate and semi-arid. The mean daily maximum and minimum temperatures are 80.0 °F and 46.3 °F, respectively (1948-2005 Climate Summary for Safford Agricultural Center, Western Regional Climate Center). The mean annual precipitation is 9.0 inches, with the months of July – October being the only months with more than one inch of precipitation on average. Average annual snowfall is one inch. The town of Safford is located in the Safford valley (elevation approximately 2,950 feet) on the Gila River, between the Pinaleno Mountains to the southwest, and the Gila Mountains to the northeast. Winds are funneled through the valley, predominantly from the northwest and southeast. Stronger winds occur during summer monsoon thunderstorms.

AIR QUALITY

The following sections discuss the ambient (outdoor) air quality in the Safford area.

Air Quality Standards and Pollutants of Concern

The USEPA has established National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, particulate matter (PM₁₀ and PM_{2.5}) and lead. These standards were adopted based on protection of public health. If an area meets the NAAQS, it is said to be in attainment of the standards for each pollutant. If an area exceeds the NAAQS for any criteria pollutant, it is declared to be in nonattainment of the standard for that specific pollutant.

The Arizona Department of Environmental Quality (ADEQ) is designated by the USEPA to monitor for NAAQS and to regulate sources of air pollution in Arizona. ADEQ has not adopted more restrictive standards than the NAAQS for the six criteria air pollutants.

The State of Arizona has established Arizona Ambient Air Quality Guidelines (AAAQGs) for hazardous air pollutants (HAPs). HAPs are defined as those pollutants that are known or suspected to cause serious health problems. These guidelines are based on conservative risk assessments to protect public health. Many of the AAAQG compounds are also Federal HAPs under the Clean Air Act (Section 112).

The main pollutants of concern for the Arizona Eastern Railway (AZER) project are PM₁₀ and PM_{2.5} (primarily related to construction), along with NO_x, hydrocarbons or volatile organic compounds (VOCs - ozone precursors), carbon monoxide (CO), and particulate matter emissions related to diesel engines (diesel PM). Sulfur dioxide (SO₂) is not a pollutant of concern for this project because of the new federal standards requiring lower sulfur content of diesel fuel.

Transportation Conformity

Safford is not in a nonattainment area or maintenance area for any NAAQS criteria pollutant, and therefore a General Conformity Determination is not required for the Arizona Eastern Railway (AZER) project (ADEQ determination, 7/20/06).

Current Air Quality in the Safford Area

ADEQ maintains a monitor for PM₁₀ in the Safford area; this monitor has never exceeded the NAAQS, and the trend over the last 20 years shows decreasing concentrations (ADEQ 2005 Air Quality Annual Report, A.R.S. 49-424.10). Safford is near two Class I areas (Galiuro Wilderness and the Gila Wilderness), which require enhanced protection of visibility under the Regional Haze Rule.

Sensitive Receptors

The term "sensitive receptor" refers to a facility where sensitive populations (e.g. children, the elderly, acutely or chronically ill persons) are likely to be located. This may include schools, day-care centers, hospitals, and retirement homes. The project site is not located near any known sensitive receptors.

IMPACTS AND MITIGATION MEASURES

The following sections discuss potential impacts of the proposed project on the ambient (outdoor) air quality in the Safford area, and mitigation measures that could be implemented.

Construction Impacts

The construction phase of the proposed AZER rail line will temporarily affect the air quality in the immediate project area, primarily related to land grading and transportation of fill materials. The resulting temporary increase in particulate matter would be both local (PM₁₀ levels) and regional (PM_{2.5}). If there is any open burning of debris or vegetation during construction, that will also increase emissions of PM_{2.5}, carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbons or volatile organic compounds (VOCs - ozone precursors).

Construction activities will consist of clearing and grubbing, laying down the roadbed, laying track, and constructing a bridge over the Gila River. Assumptions for construction are: 8 hours a day, 5 days a week, for approximately 9 to 12 months. The resulting increase in particulate matter can be estimated using the EPA AP 42 emission factors for heavy construction operations (see emissions calculations section). The construction activities will also result in temporary increases in the concentrations of pollutants associated with off-road diesel vehicles and truck activities.

To minimize air quality impacts from construction, the contractor should use standard construction mitigation measures (best management practices) to reduce fugitive dust emissions. These mitigation strategies include watering all active construction areas at least twice daily; covering all trucks hauling soil, sand, and other loose materials; applying water two times daily to all unpaved access roads, parking areas and staging areas; and applying soil binders on unpaved roads and employee / equipment parking areas.

Operational Impacts

The operational phase of the proposed AZER rail line project will involve one round-trip train per day, 365 days / year with three GP-35 diesel electric locomotives. The emissions related to operations are assumed to begin after construction of the rail line is completed (estimated 2008) and continue on a regular schedule through the life of the mine. Emissions related to the operation of the rail line were estimated using EPA Emissions Factors for Locomotives (EPA420-F-97-051) and are reported in the emissions calculations section.

This level of activity should result in minimal air quality impacts. The use of the rail line will also result in a decrease in the use of diesel trucks that would otherwise be necessary to supply the mining operation. The locomotives used would meet EPA standards to control emissions of nitrogen oxides, hydrocarbons, carbon monoxide and particulate matter during operation.

Summary

The AZER rail line project will have minimal impact on the air quality in the Safford area. Construction activities will be temporary (9-12 months), local and mitigated by best management practices. The construction will occur in open, unpopulated areas away from the city, schools, and businesses. The rail operations will also have minimal impact, and will result in the use of less diesel fuel than if trucks were employed to supply the mining operation.

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Emissions Calculations

Construction Emissions – Heavy Construction Operations (uncontrolled)

Calculations based on the following EPA documents: AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources; 11.9 Western Surface Coal Mining; Emission Factors for Locomotives.

Assumes: medium activity level, moderate silt contents, and semi-arid climate.

Construction Phase	Dust-generating activities	Recommended emission factor - equation	Scaling Factors
Demolition and debris removal	General land clearing	#1 $E = \frac{2.6 (15.1)^{1.2}}{(2.2)^{1.3}}$ (kg/hr)	PM10 = 0.13 PM2.5 = 0.105
Site preparation (earth moving)	Bulldozing	Same as #1 above	Same as #1 above
	Loading of excavated materials into trucks	#2 $E = \frac{0.35(0.0032)(10/5)^{1.3}}{(2.2/2)^{1.4}}$ (lb/ton)	For PM2.5 = 0.15
	Truck dumping of fill material / base material	Same as #2 above	
	Compacting	Same as #1 above	Same as #1 above
General Construction	Vehicular traffic – unpaved roads	#3 $E = \frac{1.510^{0.9} \cdot 25^{0.45}}{12 \cdot 3}$ (lb/vehicle mile traveled VMT)	For PM2.5 = 0.10
	Material transfers	Same as #2 above	
	Other operations	Case-by-case basis	

Assumptions (either based on available averages or worst-case estimates):

M = moisture content = 2.2% (worst-case)

s = silt content = 15.1 % (worst-case)

U = mean wind speed = 10 mph

S = mean vehicle speed = 10 mph

W = mean vehicle weight = 25 tons

Operations Emissions – locomotives (assume Tier 2 standards apply for locomotives manufactured after 2004)

	HC g/gal	CO g/gal	NOx g/gal	PM g/gal
Line-Haul	5.4	26.6	103	3.6

Travel distance = 12.4 linear miles; assume 25 miles round trip, one round trip per day, 365 days/year.

Demolition and Debris Removal

#1 General Land Clearing

24.24354919 kg/hr TSP	1 kg = 2.2 lbs
3.151661394 kg/hr PM10	6.933655068 lbs/hr PM10
2.545572665 kg/hr PM2.5	5.600259862 lbs/hr PM2.5

Site Preparation

Bulldozing - same as #1 above

#2 Loading of Excavated Materials into Trucks 0.002413277 lb/ton PM10
0.000361992 lb/ton PM2.5

Truck Dumping of Fill Material / Base Material
same as #2 above

Compacting - same as #1 above

General Construction

#3 Vehicular Traffic - Unpaved Roads

3.305191117 lb/VMT PM10
0.330519112 lb/VMT PM2.5

Material Transfers - same as #2 above

Other Operations on a Case-by-Case Basis