RESPONSE TO COMMENT ON SILT CONTENT ESTIMATE USED AS AN EMISSION FACTOR INPUT TO ESTIMATE FUGITIVE EMISSIONS OF PARTICULATE MATTER FROM UNPAVED ROAD TRAVEL AND IMPLICATIONS FOR NAAQS DEMONSTRATION

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Summary

The USDA – Forest Service, Tonto National Forest (TNF) received comments from U.S. EPA Region 9 (EPA) on the Resolution Copper Draft Environmental Impact Statement (DEIS) pertaining to the analysis used to demonstrate conformity. Specifically, EPA requested that the implications of estimating PM_{10} emissions from certain activities using mining-sector specific average silt content values from EPA's AP-42 Chapter 13.2.2 be estimated as an alternative to the use of the Arizona Statewide average for silt content of 3.0% used in the DEIS.[1,2] While the use of a 3% average silt content is a technically appropriate value,[3] this technical memorandum

[1] Silt content is an input used in to calculate PM_{10} emissions associated with equipment and vehicle activity on unpaved industrial roads.

[2] The Resolution Copper Company (Resolution) believes that the proposed Resolution Copper Project (Project) is exempt from the General Conformity requirements because the Project is subject to New Source Review (NSR) permitting requirements. *See* 40 CFR 93.153(d)(1) (providing that, "a conformity determination is not required for … [t]he portion of an action that includes major or minor new or modified stationary sources that require a permit under the new source review (NSR) program (Section 110(a)(2)(c) and Section 173 of the Act) or the prevention of significant deterioration program (title I, part C of the Act).").

[3] This is the representative silt content used in U.S. EPA's National Emissions Inventory (1999) (ref. R ad Dust NEMO FINAL revised_4_9_2020.docx and EXCEL r13s0202_dec03.xls) for travel on unpaved roads in Arizona. The use of the 3% silt content in combination with a conservative prediction of equipment and vehicle activity at the TSF result in the representative and sufficiently conservative estimates of potential fugitive dust (PM_{10}) emissions and resulting modeled PM_{10} impacts presented in the DEIS. As a result of this work in consultation with PCAQCD, the 3%percent silt content used in the emissions analysis has been included in the PCAQCD-approved modeling protocol for the Class II air permitting of the project. The 3% silt content was also included in the modeling protocol for the NEPA analysis provided to PCAQCD, the Arizona Department of Environmental Quality, and the TNF. Technical support

provides the requested evaluation.. The evaluation reaffirms the conclusions of the DEIS that the National Ambient Air Quality Standards (NAAQS) will not be exceeded – including when using the mining-sector specific average silt content values recommended by EPA. Additional confidence in the conclusions of the DEIS comes from the fact that Resolution Copper will have air quality permits issued by Pinal County Air Quality Control District (PCAQCD) and Arizona Department of Environmental Quality (ADEQ) that will include dust control and dust mitigation compliance requirements to ensure that all applicable air quality standards and regulations are complied with during all phases of the Project (construction, operation, and closure).[4]

Mining-Sector Specific Average Silt Content Values

Equation 1(a) in EPA's AP-42 5th Edition Compilation of Air Emission Factors (AP-42), Volume 1: Stationary Point and Area Sources (AP-42) Section 13.2.2 Unpaved Roads is used in the DEIS emission inventory to estimate fugitive dust emissions due to equipment and vehicle activity on unpaved industrial roads at the Project. The equation requires input of the silt content of the unpaved road material. EPA-sponsored emission factor development studies have determined that the potential for generating dust from unpaved roads is a function of silt content. This relationship is represented in the PM_{10} emission factor equation by $(s/12)^{0.9}$ where "s" equals silt content (percent) of the unpaved road material.

Table 13.2.2-1 lists typical silt content values of surface material on industrial unpaved roads. These are the values that EPA Region 9 has requested to be evaluated as an alternative to the silt content of 3% that is included in the PCAQCD-approved modeling protocol. In AP-42 Section 13.2.2, EPA recommends the use of average silt content values from Table 13.2.2.1.

At EPA's request, the information pertaining to mining sectors that are listed in Table 13.2.2-1 have been reviewed to determine the mining-sector factor that is most representative of the Project. Two mining sectors are included in Table 13.2.2-1, Taconite mining and processing and Western Surface Coal Mining. The information from Table 13.2.2-1 for these two mining sectors are shown in Table 1.

for the use of 3% silt content is also provided in "Response to Comment on the Resolution Copper Project DEIS: Action Item AQ9 – Surface Material Silt Content Used to Estimate Fugitive Dust Emissions (Air Sciences, May 18, 2020).

[4] This is consistent with the exemption provided in the General Conformity regulations. See footnote 2 above.

Table 1 – Typical Silt Content of Surface Material of Mining Project Unpaved Roads

Mine Type	Road Use of Surface Material	Silt Content Mean
Taconite Mining and Processing	Service Road	4.3
	Haul Road to/from pit	5.8
Western Surface Coal Mining	Haul Road to/from pit	8.4
	Plant Road	5.1
	Scraper Road	17
	Haul Road (freshly graded)	24

Below is a discussion of the mining sectors and surface use/surface materials for which silt content averages are provided.

Taconite Mining – Taconite is a low-grade iron ore consisting of iron, quartz, and silicates that is mined from large open pits. It is a very hard mineral that requires blasting to loosen the ore and break it in to small pieces. Large haul trucks move the fractured ore to a processing plant where the ore is ground to fine powder. The iron is separated from the ore using magnetism.

- Service Road – Roads used for the life of the project by light and medium vehicles to access the property and associated facilities.
- Haul Road to and from pit – A main haulage road used for the life of the project by large (up to 240-ton capacity) haul trucks to haul mined taconite ore and for the empty haul trucks to return to the open pit mine.

Western Surface Coal Mining – Very large equipment (e.g., scrapers, draglines) remove large quantities of topsoil, subsoil, and overburden to expose seams of coal. Large shovels and front-end loaders load haul trucks to the crushing/loading facility where the coal is crushed and loaded (typically onto trains) for shipment to market.

- Haul road to and from pit – A main haulage road used for the life of the project by large (up to 400 ton capacity), haul trucks to haul coal and for the empty haul trucks to return to the open surface mine. Heavy loaded trucks move at speed and constantly grind unpaved road material into fines.

- Plant Road – Roads used for the life of the project by light and medium vehicles.

- Scraper Rout – Areas where large scrapers remove topsoil and subsoil from above coal seams. These surface material of these routes is comprised of loose, unconsolidated material as areas are ready for overburden removal.

- Haul Road Freshly Graded – Periodically, heavily traveled unpaved haul roads are maintained and smoothed (i.e., washboard and potholed surfaces are removed) by cutting and filling with material back and forth across the road with grader.

Both in terms of surface material and usage, service roads (taconite mining) or plant roads (western surface coal mining) are most like the unpaved industrial roads planned for the Project. Light to moderate activity by light to medium equipment and vehicles will occur on unpaved roads at the Project. Large capacity haul trucks (more typically seen at large, open-pit mining operations) will not be used during operation at the Project (at the TSF or any other part of the Project). The road use categories of haul roads, scraper routes, and freshly-graded haul roads are not representative of the unpaved roads at the Project.

Western surface coal mines and taconite mines are surface open pit mines that rely on large heavy equipment to handle and move ore and waste material across the facility. As noted, Resolution's underground mining operations, ore conveying system, covered stockpiles, and pipeline conveyance of saturated tailings do not utilize similar equipment and methods. However, these two mining sectors are the most appropriate from among the sectors listed in Table 13.2.2-1 to be representative of the Project. Because there is no clear reason to choose taconite or western surface coal mining, the western surface coal mine silt content for plant roads will conservatively be used for this assessment as it has the higher mean silt content (5.1%) compared to taconite service roads (4.8%).

Other Considerations

The technical objective of the emission estimates and air quality dispersion modeling analysis developed for the DEIS is to quantify potential impacts to air quality that are representative of the proposed Project based on the highest production year occurring during the operating life of the Project. Many individual inputs (thousands) go into these air quality analyses. A goal for the DEIS air analyses is that the combination of individual inputs (including silt content) produces results of the maximum potential impact to air quality resources that are representative of the proposed Project to promote informed decision-making that protects public health and the environment.

The collection of inputs to the DEIS emissions inventory and modeling analyses are chosen to be representative of the Project. However, some inputs are conservative in the sense that they tend to overestimate impacts associated with the project. In the case where such inputs demonstrate compliance with air quality standards, no further refinement is necessary since a demonstration based on more conservative inputs assures that any further refinement will result in even less impacts. This is the case, for example, with the equipment and vehicle fleet activity rate inputs (vehicle miles traveled, or "VMT") used for the TSF. Expected equipment and vehicle fleet activity rates at the TSF during operations (including the maximum operating year) are expected to be less than 10 percent of the activity rates assumed in the DEIS modeling. For the purpose of this analysis, however, the recalculation of emissions to accommodate EPA's request to utilize a higher average silt content does ***not*** adjust any of the other inputs – including VMTs – that would result in reduced impacts.

Recalculated PM_{10} Emissions Using Mining-Sector Average Silt Content

Air Sciences has recalculated fugitive PM_{10} emissions due to equipment and vehicle traffic on unpaved road areas at East Plant, West Plant, Filter Plant/Loadout Facility, and the TSF that were based on the site-specific/Statewide Arizona silt content (3.0%) by applying the AP-42 industry sector-specific silt content for plant roads at Western surface coal mines (5.1%).

The DEIS unpaved road fugitive PM_{10} emissions and adjusted PM_{10} emissions for all functional facilities at the Project are shown in Table 2. Methods to calculate adjusted PM_{10} emissions are as follows:

- DEIS calculations of PM_{10} are multiplied by the Silt Adjustment Multiplier (S Adj. Multiplier) to calculate Adjusted Calculations of PM_{10} for silt-influenced fugitive emission sources. The S Adj. Multiplier (1.61) equals the silt factor portion of the emission equation for 5.1% divided by the silt factor portion for 3% as shown below.

Silt factor portion of PM_{10} emission factor equation AP-42 13.2.2 equation (1a):

$$(\text{silt content}/12)^{0.9}$$

Silt Adj. Multiplier:

(Silt factor 5.1% silt content) / (Silt factor 3.0% silt content)

$$(5.1/12)^{0.9} / (3.0/12)^{0.9} = 1.61$$

- Short-term (lb/hr) PM_{10} emission rates are used for this analysis because those values would be used to model 24-hour impacts which are compared to the applicable health-based 24-hour standard.

Table 2 – DEIS and Silt Content-Adjusted PM_{10} Emissions

DEIS Calculation		S Content (%)	S Factor of Eq. (1a)		PM10 Emissions (lb/hr)
East Plant Site (EPS) - Surface	Exclude Fugitives				8.2
	Fugitive				0.38
	Fugitive - Silt Influenced	3.0	0.29		0.91
EPS - Underground	Exclude Fugitives				8.9
	Fugitive				1.97
	Fugitive - Silt Influenced	3.0	0.29		27.31
				EPS TOTAL	**47.67**
West Plant Site (WPS)	Exclude Fugitives				5.4
	Fugitive				7.51
	Fugitive - Silt Influenced	3.0	0.29		90.53
				WPS TOTAL	**103.44**
Tailings Storage Facility (TSF)	Exclude Fugitives				0.73
	Fugitive				4.21
	Fugitive - Silt Influenced	3.0	0.29		63.02
				TSF TOTAL	**67.96**
				FACILITY TOTAL	**219.07**

Adjusted Calculation		S Content (%)	S Factor of Eq. (1a)	S Adj. Multiplier	PM10 Emissions (lb/hr)
EPS - Surface	Exclude Fugitives				8.2
	Fugitive				0.38
	Fugitive - Silt Influenced	3.0	0.29	1.00	0.91
EPS - Underground	Exclude Fugitives				8.9
	Fugitive				1.97
	Fugitive - Silt Influenced	3.0	0.29	1.00	27.31
				EPS TOTAL	**47.67**
WPS	Exclude Fugitives				5.4
	Fugitive				7.51
	Fugitive - Silt Influenced	5.1	0.46	1.61	145.95
				WPS TOTAL	**158.86**
TSF	Exclude Fugitives				0.73
	Fugitive				4.21
	Fugitive - Silt Influenced & VMT Adj.	5.1	0.46	1.61	101.60
				TSF TOTAL	**106.54**
				FACILITY TOTAL	**313.06**

Effect of Adjusted Emissions on Modeled PM_{10} Impacts

As a screening approach, the ratio of adjusted PM_{10} emissions to the DEIS PM_{10} emissions can be applied to the DEIS modeled 24-hour PM_{10} concentrations to determine whether remodeling emissions with adjusted silt content estimates would result in any meaningful difference to modeling results or expected consequences to air quality due to emissions from the Project. A summary of this screening approach is presented in Table 3. For each facility (EPS, WPS, and TSF), Table 3 shows how modeled impacts from adjusted silt-influenced fugitive emissions change the total concentration (adjusted impact plus background) at two receptors. The Maximum Concentration receptor is the receptor at/near the facility boundary with the highest modeled concentration (impact plus background). The Maximum Facility Impact receptor is the receptor at/near the facility boundary with the highest modeled impact due to emissions from that facility. In each case, the modeled impact from the facility is multiplied by the ratio of adjusted PM_{10} emissions to the DEIS PM_{10} emissions.

Table 3 – Screening Approach Summary

	Ambient Air Quality Standard ($\mu g/m^3$)					150
	24-hour PM_{10} Concentration (ug/m^3)					
	EPS		WPS		TSF	
Ratio Adjusted Calculation:DEIS Calculation	1.00		1.54		1.57	
	Maximum Concentration ($\mu g/m^3$)	Maximum Facility Impact ($\mu g/m3$)	Maximum Concentration ($\mu g/m^3$)	Maximum Facility Impact ($\mu g/m3$)	Maximum Concentration ($\mu g/m^3$)	Maximum Facility Impact ($\mu g/m3$)
DEIS Maximum Impact + Background (DEIS) at Boundary Receptor	85.4	80.4	97.0	84.3	74.0	72.1
Paired-sum Background Concentration	24.4	16.9	70.6	56.9	69.4	63.3
Facility Impact	59.4	62.5	1.0	21.1	4.0	8.2
Impact from Other Project Sources	1.6	1.0	25.4	6.3	0.6	0.7
Adjusted Facility Impacts	59.4	62.5	1.6	32.4	6.3	12.8
Adjusted Facility Impact + Other Sources + Background	85.4	80.4	97.6	95.7	76.2	76.8
% of AAQS	57%	54%	65%	64%	51%	51%

The results of this screening approach indicate that increased fugitive emissions from unpaved roads due to an increase in the average silt content do not cause predicted impacts to air quality that are greater than the 24-hour ambient air quality standard for PM_{10}, confirming the NAAQS demonstration in the DEIS.