Regional Forester

Southwestern Region

333 Broadway SE

Albuquerque, NM 87102

RE: OBJECTION to the
Rosemont Copper Project
Final EIS (FEIS) and Proposed Record of Decision (Draft ROD)
Responsible Official: James Upchurch, Forest Supervisor
Coronado National Forest, Nogales Ranger District

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OBJECTIONS TO THE FEIS BY CORONADO NATIONAL FOREST FOR THE ROSEMONT COPPER PROJECT

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INTRODUCTION

Pursuant to 36 CFR Part 218, the above named party, an Objector, files this document of objections to the FEIS and Proposed ROD (including the proposed amendment to the Coronado National Forest Plan) issued by James Upchurch for the Rosemont Copper Project (Project or Mine). The Objector has filed comments on the Draft EIS as one of the signers of the comments submitted by the Save the Scenic Santa Rita Coalition submitted on or about January 27, 2012, submitted public comments #21739 and #21773 on December 15, 2011, and made oral presentation at the public hearing on the DEIS. The Objector is further listed in the Section of the FEIS called "Consulted Parties." The Objector thus has status to present this document of objections to the Forest Service Reviewing Officer.

Pursuant to 36 CFR 218.8, the Objector states that the following content of this document of objection demonstrates the connections between the January 27, 2012 comments (or "previous comments") for all issues raised herein, unless the issue or statement in the Draft ROD or FEIS arose or was made after the opportunity for comment on the DEIS closed, as detailed herein. The materials from the submissions listed in the previous paragraph are referenced and used extensively in this action. Pursuant to the Administrative Procedure Act, 5 U.S.C. §553-706, and USFS requirements, the Regional Forester's Office must provide a detailed response to each of the issues/objections raised in this document.

AIR QUALITY

Topic #1
The USFS's evaluation of potential lead emissions is based on unsupported assumptions.

In comments previously submitted by SSSR on the DEIS, it was noted that there was a lack of analysis of toxic contaminants contained in fugitive dust. (*See* SSSR *et al* item 16, page 29 calling for measurements of the fugitive dusts.) In response to these comments, the FEIS indicates that the USFS conducted an evaluation of toxic contaminants through modeling (FEIS at 218). The FEIS states, "For the purposes of this analysis, it is presumed that if compliance with the NAAQS is achieved for lead, particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and particulate matter less than or equal to 10 microns in diameter (PM_{10}), public health would be protected from any toxic components within the particulate emissions as well. " (*Id.*)

There are several objections involving the quoted FEIS statement:

- Rosemont has affirmed in its submissions to the DEIS and for the air quality permit that all particulate emissions are fugitive, regardless of the mine operation being considered, and all emissions from the blast process are fugitive whether particulates, aerosols, gases, or other items (radioactivity would qualify in this instance). The FEIS incorrectly assumes that all lead emissions are particulate based. The assumption follows from noting that throughout the FEIS, lead is only mentioned in the context of particulates. The FEIS never mentions other lead emission possibilities. See objections related to "The FEIS fails to adequately describe or address issues related to particulate matter emissions and other forms of emission of toxic air contaminants," which is Topic #6.

- The FEIS incorrectly assumes if lead in particulate matter is controlled because particulate matter is controlled, this assures that all other toxic elements in the particulate matter are also controlled. Different elements in the particulate matter have different rates of absorption and transport in the body once the particulate matter has been inhaled. The FEIS never addresses the toxicology of particulate matter as a chemical mixture.

- The NAAQS emission limits for lead are 5tpy, while for other toxic and hazardous materials the HAPs limits are 10tpy for a single toxic pollutant, and 25tpy for a combination of toxic materials. Because the limitations on lead and other toxic elements are different, the control of lead in particulates may or may not provide control for the other toxic elements. That will depend on the composition of the ore, and certain factors related to mine processes. Regardless, all emissions from all processes need to be considered because of their fugitive nature, with the particulates mainly associated with the blast process, then some from the dry stack disposal, and lastly from erosion off storage piles and during transport of materials.

- The FEIS has not presented any statistical analysis to show how lead correlates chemically with the other toxic elements in the particulate matter. Therefore, the FEIS lacks a scientific basis to assume that lead levels predict how other toxic elements in the particulate matter behave and to see how lead control provides the control needed for the other elements.

- The presumption is especially wrong for asbestos. See topic #3. Because of how asbestos is measured, there is little or no relation of lead levels as a predictor of asbestos levels and protection of public health from asbestos through control of lead in particulates.

- The FEIS does not indicate whether measurements of the toxic element content of fugitive dusts will be required under the air quality monitoring plan. Discussion under topic #6 would cause one to believe that this is not likely to occur because

the FEIS indicates that elemental analysis of particulates is not a standard procedure in particulate measurements.

Topic #2
The FEIS has not evaluated the problems of manganese as a toxic air pollutant.

In comments previously submitted by SSSR on the DEIS, it was noted that there was a lack of analysis of toxic contaminants contained in fugitive dust. (*See* SSSR *et al* item 16, page 29 calling for measurements of the fugitive dusts.) In response to these comments, the FEIS has referred to other elements, but did not mention manganese. SSSR *et al* at 90 noted that manganese was a neurotoxin and its presence in particulate matter was potentially a problem for livestock. The Forest Service has not responded to this particular DEIS comment on manganese.

- The manganese content of the ore is almost three times greater than the copper content. At such high levels, the USFS cannot assume that particulate control will handle this toxic element effectively. Manganese has four stable valence states, and is subject to photochemical activation/oxidation. Its highest stable valence state is soluble in water and acids. Thus manganese can be emitted from the dry stack pile under photochemical influence and attached to aerosols or become part of storm runoff.

- Manganese can form several types of volatile chemicals depending on the operations of the proposed mine. It can form adducts to the proposed chelating agent of the electrowinning process, and be carried with the sulfuric acid mist aerosol. Because the chelating agent is in a petroleum based solvent, the manganese adduct can also go off as a VOC. In the blast stage, manganese can form a series of carbonyl compounds by reaction with carbon monoxide. These are also volatile, but their formation is not as favored as the carbonyl compounds of other elements. FEIS does not include these special VOCs in the calculations of potential to emit toxic chemicals, and particulate formulas do not work here.

Topic #3
The FEIS relies on an inadequate evaluation of the presence of asbestos-containing materials.

In previously submitted comments, SSSR noted the failure of the DEIS to address issues related to the potential presence of asbestos containing materials in particulate matter. (SSSR *et al* at 35). In response, the Forest service has indicated in the FEIS that it "investigated the potential for asbestos containing minerals to occur within the project area" (FEIS at 227). The FEIS discusses the presence of actinolite-tremolite and asbestiform materials, and cites submissions by Rosemont's geologist and research conducted by AGS as "[P]rimary references by those who have studied in detail the geology and ore deposits of these areas note the presence of actinolite-tremolite but none indicate that it is asbestiform (Harris 2003:9)" (FEIS at 227).

The following objections pertain to the evaluation of the presence of asbestos-containing materials as described in the FEIS:

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- Section 112(b) of the Clean Air Act lists asbestos with a specific CAS number and then asbestiform minerals and mineral fibers. The CAS number applies to all forms of asbestos, whether fibrous or not. That legally means that any form of asbestos shall be considered under the law. Asbestiform minerals and other mineral fibers in this section of the Clean Air Act are not chemically identical to asbestos. The FEIS incautiously refers to "asbestos" loosely as a geological term that does not include unique chemical identity. Rather, the FEIS uses the term asbestiform, a physical characteristic of a mineral, in place of a chemical descriptor. The result is a mistaken notion about how fibrous or non-fibrous materials are subject to environmental regulations. Asbestos is not asbestiform; it is simply asbestos.

- SSSR et al at 17 raised the issued of erionite, an asbestiform mineral found in the geological strata of the Southwestern United States and border areas in Mexico. The FEIS has not responded to the DEIS comment on erionite, and actually never mentions the substance.

- The FEIS does not indicate that a complete mineralogical characterization was performed using x-ray and other microscopic methods. Thus, the mineralogical analyses of asbestos and asbestiform minerals are deficient because they apparently rely on macroscopic methods only rather than a combination of macroscopic and microscopic methods. Such a mineralogical analysis using microscopic methods is often needed for erionite because the substance is difficult to recognize in many situations.

Topic #4
The FEIS approach to preventing asbestos-related environmental problems from airborne emissions is deficient and non-protective of human health.

The FEIS states, "While asbestiform minerals may occur in many geological settings, including those of the project area, research by the AGS and by observations made directly by Rosemont geologists logging the drill cores give no indication that asbestiform minerals are present in the Rosemont deposit itself. For the purposes of the air quality analysis, the potential for the presence of airborne asbestos from mining activities is handled through analysis of all particulate matter and the ability for the project to meet air quality standards for particulate matter" (FEIS at 227).

SSSR *et al* at 17 have raised the problems of asbestos in all aspects of air quality.

The following are objections on the quoted material:

- The FEIS handling of asbestos through the analysis of all particulate matter is limiting and misleading. Asbestos is not always monitored by gravimetric measurements. Further, the information given in the FEIS does not respond to the comments made in SSSR *et al* at 17.

- The FEIS never quantified by gravimetric measurements the asbestos in geological strata, nor the strata which contain it. The FEIS cites only observations to describe its qualitative presence in geological strata. Thus, FEIS statement that it can "handle" asbestos through the particulate matter has no scientific support. Basically, the Forest Service does not know how much asbestos is present and which ore components have it.

- The air quality permit cites rules based on human exposure to asbestos and its related toxicological properties. The relevant toxicological parameters are number of particles, number of fibers, aerodynamic diameter of particles, length of fibers, all per cubic meter of air, and mineral form. The FEIS does not mention these parameters. Microscopic examination of the particulate matter provides the proper monitoring of asbestos particles and fibers. Thus, the FEIS statement that it can "handle" asbestos through particulate matter is inadequate to protect human health.

- The toxicological parameters mentioned rarely correlate with gravimetric measurements of the asbestos content in particulate matter. Asbestos and asbestiform materials typically occur as nanoparticles with a size range of 0.5-1.0 micrometers in aerodynamic radius. Further, mineral fibers less than 5 micrometers in length are usually the most toxicologically important. Because asbestos and asbestiform mineral fibers have low tensile strength, they break easily into many micro particles. The resulting number of particles per cubic meter of air can exceed the numerical toxicological limits routinely without violating a gravimetric limit. This shows that a gravimetric measurement of asbestos in particulate matter is important but clearly not sufficient for monitoring or regulatory purposes.

- The air quality permit issued by ADEQ cites asbestos rules related to the renovation and destruction of buildings which used asbestos as a building product, and has not addressed the problems of release of asbestos contained in geological strata from disturbance of the landscape or erosion. The same toxicological properties apply to the measurement of asbestos in release to the atmosphere following disturbance of the landscape and erosion processes, but the ADEQ issued permit neither mentions nor requires this. Regardless, the FEIS must address more comprehensively the release of asbestos from disturbed landscapes.

- Tremolite was not the asbestos form typically used in insulation and building materials. It tends to occur as a contaminant of other materials used in building construction or road surfaces, or from soil erosion and entrainment of dust by wind conditions. It is found in geological strata and landscapes of the Southwest United States, and released when the landscape is disturbed. It is this contaminant

situation that creates the exposure conditions to this most toxic of all forms of asbestos. The FEIS must therefore pay more attention to the problems of disturbance of the landscape as it affects environment and public health.

- The inadequate monitoring plan cannot assure that asbestos emissions will not cause a health problem because the FEIS does not show that monitoring programs for asbestos and asbestiform minerals require a microscopic examination of the particulate matter, a mineralogical analysis of particulate matter, and particle counts, the required toxicological parameters.

Suggested remedies: The USFS must provide a revised analysis of the presence of asbestos-containing materials that includes microscopic examination of asbestos particles and fibers and thus emphasizes the toxicological parameters listed above, and report complete mineral analysis of the particulate matter to assure that asbestos and related asbestiform materials, notably erionite, are not present.

Topic #5
The FEIS fails to address air quality monitoring with respect to radioactivity in particulate matter or radon gas.

The FEIS states, "Potential impacts related to radioactivity and asbestos **have been added to the FEIS** (*emphasis added*). Potential impacts to air quality, soils, and ground and surface water from pollutants associated with the mine are disclosed in Chapter 3 of the FEIS. Specifically, the potential for Technological Enhancement of Naturally Occurring Radioactive Materials (TENORM) is addressed in the Groundwater Quality section of Chapter 3, and asbestos is addressed in the Air Quality section of Chapter 3. The revised analysis indicates that air quality standards (NAAQS) are met at the perimeter fenceline and are therefore protective of public health outside of the mine site, and that all applicable water quality standards, and other laws, regulations, policies, and plans would be met by the preferred alternative" (FEIS Appendix G at G-25).

- SSSR (at 32) previously commented on the DEIS that the CNF failed to require monitoring of radioactivity in particulate matter or radon gas. The FEIS has failed to respond to this comment and still does not cover air quality monitoring with respect to any aspect of radioactivity.

- The failure to monitor air quality for radioactivity creates a TENORM problem. The FEIS added TENORM as a new issue since the DEIS, but discusses it only mentions in a context of groundwater. The background geochemical characterization reports submitted by Rosemont for both the air quality permit and EIS purposes raised the issue in its appendices with respect to any kinds of analyses in view of EPA studies on the subject in copper mines at the instigation of the ADEQ. A deficiency of the air quality permit currently under appeal includes a failure to consider TENORM or radon emissions and other aspects of radioactivity.

- The FEIS does not address human exposure to radioactivity at the fenceline. TENORM is important here, because this is the where people off the property but near it, or who come to the property are first exposed to radiation. The FEIS has not shown that human health will be protected with respect to radioactivity.

- ADEQ policy does not set specific air quality emissions requirements on radionuclides because EPA has not provided emission limits. The air quality permit accordingly did not include radioactivity. The FEIS must still address this issue under NEPA rules because EPA has declared all radioactive materials are hazardous and toxic air pollutants under Section 112 of the Clean Air Act.

- Both uranium and thorium have gravimetric analytical methods, and their level in the particulate matter can be quantified from elemental analysis. The gravimetric levels are counted toward potential to emit hazardous and toxic air pollutant limits.

Suggested remedies: Forest Service must require monitoring of radioactivity in air quality and must determine the exposure risk to human health of radioactivity at the fenceline, regardless of any ADEQ policies on not providing emissions requirements for radioactivity and not monitoring for them.

Topic #6
The FEIS fails to adequately describe or address issues related to particulate matter emissions and other forms of emission of toxic air contaminants.

SSSR provided multiple comments regarding the deficiencies in the DEIS related to the CNF's assessment of particulate matter emissions and toxic air contaminants (SSSR *et al*. At 26, item 9; page 29, item 16; page 32, item 19; page 34, item [e]). The following objections concern this passage in the FEIS regarding that investigation and the revised analysis used by the CNF:

> "The EPA defines particulate matter (PM) as a complex mixture of extremely small particles and liquid droplets. Particle matter is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of the particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 10 micrometers in aerodynamic diameter or smaller because these particles can affect the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.
>
> EPA groups particle pollution into two categories: PM_{10} – Inhalable coarse particles, such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10

micrometers in diameter. $PM_{2.5}$ – Fine particles, such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles, react in the air. The federal air quality standards, (*i.e.*, NAAQS) established maximum concentrations in ambient air for suspended PM_{10} and $PM_{2.5}$. These standards were adopted by the U.S. Environmental Protection Agency to protect public health (primary standards) and public welfare against decreased visibility as well as damage to animals, crops, vegetation and buildings (secondary standards). These primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. The Forest Service has reviewed the revised modeling analysis, which included a number of additional mitigated measures. These additional mitigated measures would further control PM_{10} emissions (which presumptively contain such compounds as lead, arsenic, chromium, cadmium and nickel). The revised analysis indicates that the preferred alternative would meet all federal air quality standards. Determination of the constituents of particulates is not a standard analysis conducted when evaluating particulate emissions. For the purposes of this analysis, it is presumed that if compliance with PM_{10} and $PM_{2.5}$ NAAQS is achieved, public health would be protected from toxic metal compounds within the particulate emissions as well. Please refer to the Air Quality and Climate Change section Chapter 3 of the FEIS for further detail," (FEIS Appendix G at G-29).

- The EPA definition does not cover <u>all</u> the emitted liquid and solid particulate matter. It does not cover <u>aerosols</u> which are a <u>multiphase system</u> of a <u>suspension</u> of particles and/or droplets in a gas (for example: sprays, mists and aerosols which move at velocities other than passively with the surrounding air and maintain their phase integrity). Those aerosols' thermodynamic and physical properties go beyond those of the individual dust particles or liquid droplets alone in the suspension.

- The EPA definition does not specify the aerodynamic diameter of liquid droplets, a concern because of differences in the dynamics of inhalation of aerosols versus dust particles or simple liquid drops not in a multiphase suspension. Arizona sets a 100 micrometers limit for droplet diameter, but other jurisdictions set limits as low as 10 micrometers in droplet diameter to be consistent with limits on dust particles. The FEIS fails to clarify this or discuss its implications with respect to air quality and health in any analyses.

- The FEIS only gives information on toxic and hazardous gaseous emissions from vehicles and fixed equipment. It omits information on gaseous emissions emanating naturally from release of ore materials or following chemical reactions

by blast products with ore constituents. Radon, a gas, can be naturally present and trapped in soils and crystalline matrix. It will be released upon blasting or other disturbance of the landscape.

- The FEIS does not quantify the releases of aerosols nor provide information on their chemical composition. The FEIS' only reference to aerosol control is for sulfuric acid mist produced in the electrowinning process, and possible dust suppression from the dry stack disposal through a drip irrigation system. The air quality permit allows shutting down this possible dry stack disposal drip system under certain conditions of high wind events, thus allowing unrestrained erosion of the dry stack and emission of toxic substances. The FEIS does not adequately address this issue. Drip systems supply water to allow for aerosol formation under certain wind and sunlight conditions. Also, the FEIS does not address the influence and effects of the Arizona monsoons, which have both high winds and intense precipitation.

- The sulfate-based aerosols not covered by the EPA definition can adsorb compounds of arsenic, cadmium, lead, selenium, sometimes manganese and antimony, and possibly uranium. These hazardous air pollutants will not be included in the potential to emit calculations in the emissions inventory which only looks at particulate matter. Those calculations will severely underestimate emissions of hazardous air pollutants under Section 112(b) of the Clean Air Act.

- Sulfate-based aerosol mists can concentrate arsenic compounds in solution at levels exceeding those predicted by the usual equilibrium calculations. Thus, dissolved arsenic levels emitted and attached to aerosols may exceed those suggested in the previous item. Particulate emission calculations cannot estimate the arsenic levels in solution.

- The lead levels adsorbed onto aerosols are not predictive of the amounts of other toxic elements and their compounds bound to aerosols. Also, the lead levels in particulate matter are not predictive of the amounts of other toxic element chemical compounds in aerosols either.

- Lead can be emitted from the dry stack disposal pile after photochemical reaction as methyl lead, a gaseous compound. This reaction can also be facilitated by TENORM (alpha particles can attack methane molecules, left over from the blast stage and spread over the Rosemont site, to form methyl free radicals). The presence of chloride and fluoride can accelerate or facilitate this reaction. Most organic lead compounds are volatile. There is also a possibility of creating a special organo-lead compound in the electrowinning process when lead adducts are formed with the chelating agent and released as a VOC in the raffinate recycle step.

- Although the ore composition data show trace levels of mercury, the same

mechanisms that can form and release methyl lead can also form and release methyl mercury, which is also volatile.

- The FEIS does not mention monitoring for toxic and hazardous gaseous compounds. There is no evidence from the FEIS that such compounds were measured spectrographically following blasting. Consequently, the Forest Service cannot support the statement that the project will not release toxic air pollutants beyond the fenceline because they are not measuring them to confirm their assumptions.

- The FEIS failure to consider emissions of gaseous pollutants is also new information based on issues raised by the FEIS. Illustrative gaseous compounds, listed under Section 112(b) of the Clean Air Act, that can form in the blast stage and be emitted include: arsene, arseneous acid, phosphene, nickel carbonyl, carbon disulfide, carbonyl sulfide, hydrogen selenide, selenium sulfide, elemental phosphorus. Compounds that can form and be released from the dry stack disposal because of photochemical activation and aerosol formation are the two previously mentioned methyl lead and methyl mercury, as well as arseneous acid. Elemental phosphorus can polymerize to varying degrees in rings and chains, can be either gaseous or particulate, or some combination of the two. The equations used to estimate particulate matter emissions do not apply to the gaseous pollutants.

- The Forest Service has accepted Rosemont's emissions inventory in which the calculations are based entirely on formulas in EPA manual AP-42 and related references for particulate emissions and do not consider other mechanisms and sources of emissions for the blast process and dry stack disposal pile. The formulas for emissions from the blast stage give default positions in the absence of data from a specific project. The formulas were statistically derived from studies of Western coal mines. They might not apply well to the ore material which Rosemont seeks to exploit because of differences in chemical composition between Western coal and copper ore on the number, concentration and variety of toxic elements. These differences result in underestimates of the amount of particulate matter released during the blast stage as well as the kind of hazardous air pollutants formed. All users of AP-42 and related manuals are advised and encouraged to provide data more specific to their mining or quarrying interests. Rosemont has used the formulas in lieu of any studies.

- EPA manual AP-42 does not provide formulas for gaseous emissions except for categorical sources, which mining is not. Therefore, in order to perform potential to emit calculations of hazardous and toxic air pollutants for the Rosemont project, other methods not found in either Rosemont reports or referenced in the FEIS must be used.

- The FEIS does not protect health from exposure to carcinogenic, mutagenic, neurotoxic and teratogenic effects from specific toxic elements released as air pollutants. The FEIS incorrectly assumes that the pollutants that cause these

effects in humans and livestock which graze on Forest Service leased plots are controlled through particulates only. Many selenium and arsenic compounds are volatile. Selenium compounds can enter plants directly from the gaseous state through stomata, and volatile arsenic compounds can crystallize on plant surfaces or ground then be washed into soil and absorbed (see SSSR *et al* 60 and 89).

- The FEIS states that determination of the constituents of particulates is not a standard analysis conducted when evaluating particulate emissions, but it is still essential to quantify the potential to emit toxic and hazardous air pollutants, a requirement of the Clean Air Act Section 112. The FEIS statement is irrelevant to the Forest Service requirement to show that the emissions from the mine will not violate the Clean Air Act, Section 112.

- The Forest Service discussion ignores the radioactivity content of the air particulate emissions following the blast stage. Uranium and thorium will be present in the particulate matter. Both elements can be measured gravimetrically, and will be part of any elemental analysis of particulates. The FEIS has not responded to the comments here by SSSR *et al*. (at 15).

Topic #7
The FEIS fails to provide risk assessments for the effects of toxic and hazardous air pollutants on human health.

SSSR *et al* at 15 raised the need for risk assessments for cancer, and mutagenic, teratogenic and neurotoxic exposure to air pollutants. The FEIS has a single remark on this issue (FEIS 244): "Based on the latest 2002 assessment, resident cancer, neurological, and respiratory risks from hazardous air pollutants in the project area are estimated to be low (average total risk is 21 in 1 million)". The FEIS statement is inadequate and not responsive.

- The problem is not background rates, but increased risks and numbers of cases above background rates. The FEIS has not addressed these factors. This omission in the FEIS statement (FEIS 244) further betrays a lack of scientific understanding about environmental risk assessment.

- The risk assessment issues are related to cumulative effects requirements under NEPA. The analysis for exposure to environmental toxicants primarily depends on predicted levels of emission, dispersion and transport to the receptors. The resultant exposure is then analyzed for the increase in the risk levels. The resulting increased risks above the background level are readily foreseeable possibilities, and the FEIS must include a quantitative cumulative impact analysis.

- There is no indication in the FEIS that the USFS has any intention of performing or sponsoring epidemiological studies to assist the risk assessment process. However, such studies are essential concurrent activities with any Rosemont Copper operations to quantify and correct any health problems that arise in

exposed populations.

Suggested Remedies: The Forest Service must include risk assessments for the exposure of carcinogenic, mutagenic, teratogenic and neurotoxic air pollutants, and include among these assessments appropriate concerns for radioactive materials. These assessments must quantify the increased risk of these impacts as well as the increased number of cases above the previously provided background rates in the FEIS. If necessary, the Forest Service must make epidemiological studies of health effects a concurrent activity with any mining approval to quantify and correct any health problems that arise in exposed populations with respect to mine activities.

Topic #8
The FEIS must correct potential errors with respect to NESHAP rules and clarify entries of Table 29.

Table 29 of the FEIS addresses regulations and laws on air quality. The FEIS refers to NESHAP rules: "Based on the estimated, maximum potential emissions for the proposed mine operation, the Rosemont Copper Project would not be a "major HAP source." However, applicable NESHAPs pertaining to the boiler, emergency engine, and storage tanks would apply." Because previous objections in this section refer to HAPs (hazardous air pollutants) and the failure of the FEIS to deal adequately with them, as well as inadequacies and the incomplete nature of the emissions inventory, this statement needs to be corrected. This statement is erroneous because Rosemont Copper Project can become a major source of HAPs. Rosemont and the FEIS have failed to consider HAPs emissions through routes other than particulate matter, and failure to address effectively the problems of asbestos and radioactive materials, as indicated in the topic #6 of this document.

Table 29 also states in the section on General Conformity Analysis: "The project site is in attainment for all criteria pollutants, but the greater Tucson area contains a PM_{10} non-attainment area and a CO maintenance area. Under ADEQ requirements, the project also does not exceed major source thresholds. The Coronado has analyzed the project for effects on NFS surface resources, not conformity. The Coronado has used meeting of NAAQS at the perimeter fenceline as an indicator that NFS surface resources would not be unduly impacted by project emissions." Because objections in this paper show that the Rosemont Copper project can cause exceedances of NAAQS, several questions need to be answered and the answers are needed to correct the Table 29 entry. The project site might not be in attainment for all NAAQS. See Topic #15. What is unduly impacted? How does "meeting at the perimeter fenceline" act as an indicator?

Topic #9
The air quality monitoring protocols described in the FEIS are inadequate.

SSSR has previously commented that all air quality monitoring is inadequate in (SSSR *et al* at 32). Thus, any air quality protocols proposed for any aspect of the proposed mine operations are subject to comment, and specifics included in the FEIS are new

information.

The FEIS (287) in discussing the coarse ore stockpile dome as a mitigation measure states: "The air quality permit requires the installation and operation of continuous ambient monitors of PM_{10} and on site meteorological data beginning at least 90 days prior to the start of mine operations. A protocol and monitoring plan would be required to be submitted within 180 days of the issuance of the air quality permit."

The following are objections:

- Why is there no monitoring for $PM_{2.5}$? Monitoring of $PM_{2.5}$ is not subsumed by monitoring PM_{10} because the presence of debris of larger size than $PM_{2.5}$ can mask any observed $PM_{2.5}$ materials in the PM_{10}. Monitoring is required for both PM fractions.

- The calendar of required activities under the air quality permit may conflict with respect to installation of particulate monitors and the required monitoring and therefore is a problem with respect to mine start-up activities.

- The monitoring protocol should be provided as an appendix in the FEIS and not await the final decision on this project, because then it will not be automatically subject to public comment. In point of fact, where is the protocol? The ADEQ air quality permit was issued in January 2013, and despite the fact that the air quality permit is under appeal, a full year has passed and the existence of the monitoring protocol is indeterminate from reading the FEIS.

Topic #10
The FEIS relies unwisely and entirely on ADEQ for monitoring and enforcement of mitigating measures for air quality. The monitoring and mitigation measures described in Appendix B are entirely new; thus, the Forest Service must allow for public review and comment through a revised DEIS. The FEIS also fails to establish an enforceable mechanism to assure that the array of mitigation and monitoring measures will be adequate, without relying solely on the limited measures proposed by ADEQ.

SSSR (at 32) has previously commented that all air quality monitoring is inadequate. Therefore any aspect of monitoring is available for comment and objection. Further, the materials in Appendix B with respect to monitoring and mitigating measures are new information which has not been previously subject to public review and comment.

- The FEIS mentions monitoring for mitigating measures with respect to emissions of air pollutants in Appendix B (B-76 to B-83). These measures depend almost entirely on the air quality permit issued by ADEQ. Forest Service has abnegated all responsibility for monitoring and determination of mitigating measures of air quality to ADEQ except possibly for opacity. The revised air quality analyses performed for the Forest Service, even though inadequate, riddled with errors and

faulty, should still should have resulted in the specification of mitigating measures beyond what those currently indicated in the air quality permit.

- The FEIS fails to show that the Forest Service can respond appropriately and in a timely manner to problems related to air quality within their purview. The FEIS shows only that the Forest Service passively receives monitoring reports from Rosemont and ADEQ?

Suggested remedies: The Forest Service must provide additional mitigating and monitoring requirements to address the deficiencies in air quality described in this objections document to augment and reinforce the effectiveness of ADEQ permit requirements. The Forest Service must show explicitly what action it plans to take and in what time frame to demonstrate that it does more than just passively receive monitoring reports from Rosemont and ADEQ. As stated in the topic sentence: The monitoring and mitigation measures described in Appendix B are entirely new; thus, the Forest Service must allow for public review and comment through a revised DEIS. The FEIS also fails to establish an enforceable mechanism to assure that the array of mitigation and monitoring measures will be adequate, without relying solely on the limited measures proposed by ADEQ.

Topic #11
The FEIS cannot rely on voluntary measures to meaningfully offset emissions.

According to the FEIS, "The voluntary carpooling plan is estimated to offset or reduce NOx emissions by approximately 1,200 pounds per year" (FEIS at 287). This statement represents new information not previously subject to public comment.

- SSSR has previously commented on the ineffectiveness of possible carpooling efforts with respect to traffic issues at the site, but the relationship of carpooling to air quality stated by the Forest Service is new information. CNF cannot rely on voluntary measures to reduce NOx emissions. This reference which implies that the voluntary carpooling plan, which is virtually impossible to enforce and is unlikely to be implemented, offers some mitigation, must be removed from the FEIS.

- The reductions of NOx emissions estimated in the FEIS may be overly optimistic. The FEIS analysis (FEIS 990) omits many details needed to verify the proposed estimate which is based on a comparison of the carpooling proposals of the DEIS and this new approach. Depending, for example, on the kinds of buses used and their air pollutant emission characteristics, the numbers could be very much less (as much as 50% less) than the approximated reduced emissions. The FEIS lacks any supporting calculations for its estimates.

Topic #12

The FEIS incorrectly totally relies on the ADEQ permit to ensure the project meets all Federal, State and local requirements.

The FEIS states, "On January 31, 2013, ADEQ issued the "Air Quality Class II Synthetic Minor Permit for the Rosemont Project" (Permit No. 55223) (Arizona Department of Environmental Quality 2013a). According to ADEQ, the air quality permit will ensure that Rosemont Copper meets all Federal, State, and local requirements by operating with enhanced emissions controls" (FEIS at 219). FEIS discussion of the issuance of the ADEQ air quality permit is new information not previously subject to public comment.

The following are objections to this quoted material from the FEIS:

- The first objection relates to the definition and concept of a "class II synthetic minor permit." According to ADEQ officials, a "class II synthetic minor permit" involves negotiating voluntary conditions with the permit applicant when the proposed project can potentially violate air quality standards but administrative restrictions or ADEQ policy may prevent officials from issuing a Class 1 permit. A standard class II permit does not have negotiated conditions. The applicant is neither required to accept nor to undertake any negotiations. The FEIS needs to note that reliance upon negotiated items raises enforcement credibility issues, and the FEIS cannot depend on voluntary or negotiated conditions, even though ADEQ claims that once in the air quality permit, they become enforceable. Refer also to Topic #11.

- Testimony in the air quality permit appeal hearings indicated a strong likelihood that the negotiated status was illegal under Arizona law, a finding that could result in revocation of the permit. Rosemont, as an Intervenor in the hearings, knew of this testimony as of August 2013, and since the hearing record is public, so should the Forest Service. Thus USFS had plenty of time to factor this information into the FEIS (see: Air Quality Permit Hearing document 195).[1]

- By issuing a Class II synthetic permit, ADEQ has basically admitted that the Rosemont Copper project is very likely a major source, even if not a categorical source, and therefore should apply for a Class I permit. The FEIS needs to factor this information into a cumulative effects analysis because such a permit change

[1] See document 195 of the record of documents for the Air Quality Appeals Hearing. https://portal.azoah.com/oedf/documents/13A-A006-DEQ/

Appellant Joel Fisher's Reply Brief, page 27, footnote 10:
ADEQ and Rosemont fail to address or rebut the legal issue raised by the Appellant based on evidence at hearing on this point that Agency has violated state law by relying on standards more stringent than federal law, which are enforceable as part of the permit (Transcript at 382-30, A.R.S. 49-104.A.17) ("Unless specifically authorized by the legislature, ensure that state laws, rules, standards, permits, variances and orders are adopted and construed to be consistent with and no more stringent than the corresponding federal that addresses the same subject matter.") Appellant's Br. P27, II 10-12, corrected by Notice of Errata at p.2, H. 9-18.)

is a foreseeable event under NEPA

- ADEQ has not ensured that Rosemont Copper meets all Federal, State and local regulations. ADEQ has neither adequately nor effectively consider the potential to emit toxic and hazardous materials under Section 112(b) of the Clean Air Act. This is especially highlighted by the fact that ADEQ has not considered gaseous and aerosol based hazardous pollutants following blasting and erosion from the dry stack disposal pile. The FEIS has not addressed the blast stage, and has addressed inadequately the dry stack disposal pile

- The air quality permit mandates technology which ADEQ claims works well elsewhere. During the air quality appeal hearing, ADEQ indicated that it relied on the manufacturers' technical literature about their specific products and not on independent testing, and also on some limited other situations where this technology was applied. ADEQ's remarks revealed serious misinterpretation and mistaken views on the efficiency of the equipment. The FEIS has accepted blindly that the technology required by ADEQ will guarantee the necessary protection.

- The FEIS states that: "the modeling conducted by ADEQ to demonstrate compliance with NAAQS is not the same as that considered in the FEIS. The air permitting process typically only includes stationary emissions, whereas the modeling conducted for the FEIS included both stationary and mobile emission sources in order to provide a full analysis of the potential emissions." The FEIS modeling was incomplete because it did not include the potential to emit calculations for toxic and hazardous air pollutants which requires that fugitive sources, regardless of whether stationary or mobile, be included, and did not model radiation emissions through TENORM or other routes.

- The FEIS (245) states that: "Fugitive emissions are not included in the determination of potential to emit unless a source is listed in 1 of 28 source categories under 40CFR52.21 (b)(1)(ii). ADEQ issued a minor source air construction permit on January 31, 2013, because the majority of emissions from the Rosemont Copper mine would be classified as fugitive. Under AAC, Title 18, Chapter 2, Section 319, review of increments is not explicitly required for minor source air construction permits." However, the fugitive emission must be counted in any potential to emit calculations for hazardous air pollutants under Section 112 of the Clean Air Act. The FEIS has not acknowledged this. The potential to emit calculations can change a Class II minor source into a Class I major source. Thus a minor source air construction permit may be inappropriate, but regardless, the issuance of that permit is irrelevant to NEPA requirements.

- The configuration of the Rosemont Copper project which received the air quality permit does not correspond to the proposed current configuration in the FEIS. ADEQ stated in its public hearings that they could only address the permit application currently before them, and if the project design changes sufficient to change the air pollution analysis, then they would require amendments to the

permit. The air quality permit does not meet all regulatory requirements in general in the present air quality permit because the ADEQ technical review of the application was inadequate. The deficiencies will carry over to the revised configuration as well.

Topic #13
The FEIS discussion of the blast process is inadequate because it does not address the chemical production and release of toxic air pollutants and fails to give consideration to the relationship between the blast process and emission of greenhouse gases.

The FIS (384) states that: "The potential for presence of residue from the use of nitrogen-based explosives has been well documented in the literature (Ferguson and Leask, 1988; Forsyth *et al* n.d. 1995; Martin and Hutt, 2009; Pommen, 1983; Revey, 1996). The explosive reaction that occurs involving ammonium nitrate and fuel ideally generates only water, carbon dioxide gas, nitrogen gas, and heat. It is the rapid release and expansion of these gases that creates the explosive power of the mixture. However the reaction is seldom completely efficient, and nitrogen can remain as a residue in the waste rock and in the blast zone."

This is new information and new issue raised by the FEIS not previously subject to public comment. There are several objections to the quoted material.

- Any reaction that is not "ideal" is by definition in some way "not completely efficient." The adjective *seldom* is scientifically wrong. The Second Law of Thermodynamics guarantees that nitrogen residue will always be present in the waste rock and in the blast zone.

- The FEIS does not address "inefficiency" as a consequence of the Second Law of Thermodynamics. This inefficiency is first characterized by products of incomplete combustion, such as carbon monoxide, ammonia and methane. Carbon monoxide is acknowledged in the emission inventory as a blast product, but methane is only acknowledged with respect to its being a greenhouse gas. The ammonia is never mentioned. Further, many explosives also produce hydrogen sulfide as a blast product of incomplete combustion along with the acknowledge sulfur dioxide. The FEIS says nothing about this.

- The emissions inventory submitted by Rosemont for an air quality permit is not required to provide data on the emissions of either ammonia or hydrogen sulfide, because they are not listed under the Clean Air Act as chemicals of concern for any situation. Also, EPA Manual AP-42 does not provide that information. That has no effect on the NEPA process. The FEIS needs those, which are publicly available, but which neither Rosemont nor ADEQ nor has the Forest Service sought, because without those data, the estimates for nitrogen and sulfur deposition in Class 1 national parks and forests are incomplete and faulty.

- The “inefficiency” is also characterized by the heat released in the blast. Some is waste heat, a friction factor, which reduces the work efficiency of the pressure wave caused by the blast in fracturing rock. Efficiency values tend to be in the range of 30-60% because of the temperatures of the processes. The heat released will raise borehole temperatures and will provide energy to overcome thermal barriers to chemical reactions. Under these conditions, carbon monoxide and methane are powerful chemical reducing agents. Carbon monoxide can reduce the mineral matrix and extract such elements as arsenic, fluorine, lead, mercury, nickel, phosphorus and selenium. The carbon monoxide and methane can react with these elements to form compounds, many of which are gaseous hazardous and toxic air pollutants. Arsene and phosphene, previously mentioned gaseous compounds, are two examples.

- The quantities of carbon monoxide and methane generated as blast products far exceed the stoichiometric amounts needed to react with the ore constituents to produce gaseous toxic substances in amounts which cause exceedances of the toxic substance emission limitations under Section 112 of the Clean Air of 10tpy of a single substance (except for lead which is 5tpy) and 25tpy for a combination of substances. The blast process alone can potential generate enough toxic and hazardous gaseous products to exceed limits of the Clean Air Act. A toxic air pollutant exceedance is a violation of the Clean Air Act, and requires that the class II minor source be declared a class I major source. Rosemont would then have to reapply for the air quality permit and seek a Class I permit.

- The formation of neutral nitrogen gas as a blast product is the least thermodynamically favored chemical product of the blast process. It is safe to assume that the production of nitrogen gas as a blast product is negligible, and all nitrogen compounds coming off the blast process are technically “residues” as the term is used in the FEIS. Further, if the blast temperatures are high enough, it is possible for neutral nitrogen gas in the air over the site to undergo chemical reaction and produce nitrogen oxides. This would increase the amount of nitrogen oxides in deposition of nitrate calculations for Class 1 national parks and forests.

- Several of the cited references refer to coal. Copper ore and coal are not corresponding chemical materials, and their physical properties (hardness, density, specific heat, etc.) are different. The discussions in the FEIS based on the calculations from EPA Manual AP-42 must be in the context of the material being processed, and not in terms of default positions because essential data were not obtained.

- Although the FEIS acknowledges that carbon dioxide, methane, and nitrous oxides are greenhouse gases, the FEIS cites the overwhelming presence of carbon dioxide as the major issue. The methane and nitrous oxides, although of considerably lesser quantity are none the less important, and should be acknowledged in the FEIS, especially since they are blast products.

Topic #14

The FEIS continues to use air quality data and meteorological data inappropriately and fails to correct problems of modeling, and statistical analyses in its revised modeling of air quality transport and dispersion.

SSSR has provided many comments on the inadequacies, flaws, errors in technique and execution of modeling, deficiencies in analyses with respect to the data collected, the meteorological data collected or used from other sources, the site characteristics, and the nature of the models being used to determine air quality impacts and dispersion and transport of pollutants, and the protocols generating of this work (SSSR *et al* 125-134). The Forest Service has indicated that it has revised extensively the air quality analysis and modeling. Yet so many of the original deficiencies remain and have not been in the revised modeling that most, if not all, of the modeling results upon which the Forest Service has based its decisions flawed, defective, erroneous, and not supportive of any decision making. The revised modeling mentioned in the FEIS is new information not previously subject to public comments (FEIS 217).

- The USFS continues to rely on defective modeling to determine air quality impacts. The revised protocol information submitted in 2012 does not appear to show significant improvements or major changes over the poorly developed original protocols for the AERMOD and CALPUFF modeling with respect to quality assurance, project management, data handling and computational elements.

- The choice of key input parameters appear to be completely inappropriate for the Rosemont site. Incorrect AERMOD parameter settings seem to unchanged in all of the revised modeling for the FEIS.

- The FEIS states: “Revised modeling indicated that the Barrel Alternative would meet NAAQS at the perimeter fence. There has been a reduction in emissions of coarse dust particles of 47 tons and of fine particles of 43 tons compared with the original Pima County air quality permit application submitted by Rosemont Copper” (FEIS 287).The air quality permit calls for certain technologies to achieve these reductions. In the air quality permit appeal hearing it was learned that ADEQ relied mainly on manufacturers’ literature on performance and equipment efficiencies, and a few cases where the technology was used. The hearing also showed that ADEQ misinterpreted much of these commercial data. Consequently, the quote does not assure that the technology will work as planned.

Topic #15

The FEIS has mistakenly based its decision on using the low NO_2/NOx ratio in its revised air quality simulations rather than the higher NO_2/NOx ratio.

In its explanation of revised modeling, the FEIS states: "The Coronado has determined that several key assumptions selected by Rosemont Copper to model air quality imnpacts are appropriate and has based conclusions in the FEIS on these values. Specifically, an NO_2 to NOx ratio of 0.05 was considered appropriate, and a background PM10 concentration of 47.7μg/m3 was considered appropriate. This is new information since the DEIS was released and not available for previous public review and comment. Modeling using variations of these assumptions was also conducted for comparison, specifically an NO_2 to NOx ratio of 0.1 and a background PM_{10} concentration of 37.4μg/m3. These alternative modeling results are provided for comparison (shown by the shaded cells in table 45) but are not considered the most appropriate assumptions and therefore are not used to draw conclusions about compliance with NAAQS for this analysis. As shown in table 45, these alternative assumptions result in the inability to meet NAAQS at the perimeter fence for any of the alternatives." (FEIS at 260; emphasis added).

- The CNF decision to base their conclusion on the lower NO_2/NO_x ratio of 0.05 in determining compliance with NAAQS standards is not justified. CNF chose the ratio because it applies to haul trucks and mobile sources, and because the mobile sources are the major source of nitrogen oxides. But the FEIS continues in the same section by noting that the ratio from blast studies goes as high as 0.5, ten times greater. Blast processes for the mine produce a significant portion of the NO_2/NO_x ratio, and consequently, the USFS should have chosen a higher possible value ratio (and a more conservative value, as required by the EPA regulations) rather than the 0.05 value. At the least, the 0.1 ratio is a more prudent and authorized worst case limit in this situation, and it should have been used as the basis for the analysis.

- ADEQ does not require a worst case analysis for an air quality permit application if the worst case does not reflect actual operating conditions. It is not known if 0.1 is a worst case situation here, but it is certainly a possible situation when the mine is in operation as well as a conservative approach which NEPA regulations require. Accordingly, the USFS analysis should have included a sensitivity analysis which quantifies the threshold value of the NO_2/NO_x ratio which triggers noncompliance. That information would have allowed USFS to require additional NOx control needed to achieve its regulatory requirements with respect to nitrate deposition in Class I areas.

- The revised simulations with the lower value of the NO_2/NO_x ratio found all alternatives except the Barrel Canyon alternative non-compliant with the NAAQS at the fenceline. The revised simulation using the higher value of the NO_2/NO_x ratio found that the Barrel Canyon alternative was now also non-compliant. This finding proves that the AERMOD and CALPUFF modeling cannot support any

alternative chosen by the USFS. The results leave the USFS open to valid and legitimate criticism that the modeling results to support the Barrel Canyon alternative may have been manipulated to show compliance with NAAQS standards, when in fact compliance still remains in serious question.

Topic #16

The FEIS revised AERMOD analysis continues to use inappropriate, incomplete, and inadequate input data so that its results showing NAAQS compliance are not reliable; furthermore, the FEIS failed to use the current AERMOD guidance in its analysis.

SSSR previous submitted detailed comments on the DEIS on the deficiencies in the use of AERMOD. (*See* SSSR et al. at 20-36.) In response, the FEIS states that Rosemont Copper's consultants ran modeling scenarios and calculations in 2012 to address these and other public comments.. (FEIS at 226). The FEIS further indicates that "the Forest Service provided direction to Rosemont Copper concerning the assumptions and methodologies to be used in the AERMOD modeling (Rosemont Copper Company 2012d)" (FEIS at 226.) There are several objections to the materials which the USFS has provided.

- The revised AERMOD analyses remain dangerously flawed and cannot be relied upon for any purpose of the EIS. The modeling protocol materials submitted in revised reports of 2012 did not correct many errors and problems of the original model protocol used in 2009 report, errors that were pointed out in previous comments. (*See* SSSR et al. at 125-134.)

- The revised modeling continues to use inaccurate albedo and Bowen Ratio numbers, which have not been corrected in spite of photographic evidence by an outside party that the numbers chosen are clearly erroneous. The use of incorrect albedo and Bowen Ratio numbers renders all meteorological estimates with these models worthless and not reflective of known real world conditions at the site.

- Since the issuance of the DEIS, more photographic evidence by an independent party has further highlighted the inaccurate choices of albedo. The new photographic evidence clarifies some of the modeling deficiencies.[2]

    (a) The albedo values in the DEIS were seasonal averages based on typical "default" positions for various landscape characteristics. Those numbers chosen were not representative of the vegetative covering and coloring of the site. The modelers chose a constant albedo of 0.25 year around for the revised modeling, suggesting a more uniformly arid and brown landscape than actually exists.

[2] Robert A. Maddox, "A photographic assessment of greenness and land surface character at the proposed Rosemont Copper Mine site," 6pp. http://tinyurl.com/m8gm7xy

(b) Albedo is one of the most difficult numbers and concepts to quantify. Although it is a positive number between 0 and 1, the number chosen can affect climate and meteorological models even to the fourth decimal place. However, the modelers only used a two decimal place number, and that was again an unwise and mistaken default position.

(c) Many problems of choosing a correct albedo number could have been solved or avoided if there were a major effort in establishing "ground truth" at the site. Rosemont's consultants should have kept notes and photographic evidence of the landscape and vegetation as "ground truth observations" during the periods of instrument maintenance and changing of filters for particulate measurements.

(d) Some of the problems are also illustrated by a site description which accompanies Figure 84 of the FEIS (FEIS 787). Most of the description is accurate, and provides important information on greening following monsoons and winter rains. The purpose of Figure 84 was to address aesthetic aspects and scenic vistas, and is critical to understanding the landscape setting. The Figure came from one USFS' own reports, but seems not to have been used in the air quality modeling for the FEIS. The descriptions could have influenced more accurate albedo choices.

- SSSR *et al* at 125-134 noted that the meteorological and climatological characterization of the site was deficient and non-representative because a single sheltered monitoring site at ground level was used to represent the entire project site. The data collection ignored the fact that the dry stack disposal pile would have erosion based emissions at higher elevations, and ignored complexities in the terrain and geography of the project site such as area extent of the site, patterns of elevation change, and even wind direction. The revised modeling suggests only use of the original site. Therefore the data used continue to be non-representative.

- The revised modeling continues to use inappropriate reference sites for background data on NAAQS and meteorological parameters even though the FEIS states that updated information was used. Rosemont's consultants originally only measured PM_{10}, wind speed and temperature. They later added humidity. The modelers had to rely on data from reference sites which might parallel the environment at the Rosemont site to fill in the other needed parameters. Such reference sites are few and at great distances from the Rosemont site, make choices very questionable. The FEIS remark about updated background data has little credibility in this case.

- The revised modeling uses a data run from 2007 to 2010 in lieu of the original compromised data run from 2006 to 2009, which were criticized in its comments on the DEIS. The JBR report indicates only 9 hours of data in a three year period were lost, but FEIS Figure 39 (FEIS 237) shows a wind rose for 2008 with 23

hours of missing data. The modelers make reference to Appendix W of the Clean Air Act, the guidance document for AERMOD, but do not indicate what they actually did. Although the amount of missing data is considerably less than the original compromised set, the problems of possible improper data imputation procedures for missing data characterizing the original data run potentially remain.

- AERMOD as a platform cannot handle extreme value statistics. The model only accommodates smoothed data. Thus, the modeling cannot address the several recent events in Pima County related to severe wind induced dust storms, nor the fact that erosion of the dry stack at the altitudes associated with the project typically show much higher wind velocities as noted in adjacent federal lands, than are used in the analyses.

- AERMOD as a modeling platform cannot handle chemical reactions and does not handle aerosols well. The chemical reaction need applies mainly to ozone reactions and its generation at specific receptors. This is needed to understand how Rosemont emissions affect ozone levels at Tucson air quality monitoring locations in addressing possible violations of the NAAQS standard for ozone. The analysis could also result in determining whether Tucson has non-attainment areas for NOx and ozone. See topic #20. The aerosol capability is needed for USFS to assure that modeling does not indicate a problem of pollutant exceedances at the property fence line, also to describe effects of specific pollutants on receptors like Class 1 national parks and forest lands.

- The modeling protocol would have required considerable expansion to accommodate an increased number of sample sites. AERMOD can only handle one data run at a time. And a single site represents the data set for a run. If more than one site had been studied for its meteorological and climatological behavior, as is appropriate given the terrain complexity, the protocol would have required an analysis scheme to evaluate the findings of all of the AERMOD runs for the different sampling locations in order to address the dispersion, transport and effects modeling outcomes and their interpretations.

- There was no clear evidence that USFS was aware that the USEPA released a new version of AERMOD in December 2012. The same month, a major user of AERMOD, Lisa Willing of Wenck Associates, Inc. posted an online alert to users of AERMOD engaged in current modeling that they may need to reevaluate all the meteorological data and rerun all of their meteorological data in the light of this new release. This would affect any modeling submitted to USFS for the FEIS in late 2012 and then in 2013. The FEIS contains no evidence of a knowledge of or consideration of this alert. Without the FEIS giving specific reasons as to why such an alert is not applicable, there exist serious doubts as to the accuracy and relevance of the model results being reported.

- The FEIS notes that the revised modeling followed consultations with various

agencies, including EPA Region 9. Also the FEIS states that USFS "directed" the revised modeling effort. The consultations were inadequately documented and thus what advice was given is unknown. The participation of EPA can create the false impression that EPA approves of the modeling results. An agency's technical assistance does not obligate it to accept the outcomes. EPA groups that provide technical assistance and review/approval are separate agency entities.

Suggested Remedies: The USFS must provide a new analysis that measures the background of all NAAQS parameters at the site and that addresses deficiencies in establishing the representativeness of the climatological and meteorological characterization of the Rosemont site. The USFS must use other models to examine the aerosol and chemical reaction possibilities of these pollutants. The USFS must present this information in a revised DEIS that is made available for public review and comment.

Topic #17
The FEIS revised models with CALPUFF continue to demonstrate problems.

SSSR et al (2) detailed problems in using CALPUFF in the DEIS. In the FEIS (217), the USFS made comments about revising protocols for CALPUFF and directing studies with the modeling platform similar to those with AERMOD. With respect to the specific modeling with CALPUFF, the FEIS indicated: "After receipt of additional modeling submitted to the Coronado, it was determined that the restart options in the CALPUFF modeling had not been set to the preferred settings. At the request of the Coronado, a sensitivity analysis was developed cooperatively with Rosemont Copper's consultant to determine the relative impact of revising the restart option in CALPUFF. The sensitivity analysis consisted of examining one of the months that is likely to have the greatest impact from the potential restart issue. Ultimately, the annual Barrel Alternative emissions scenario was remodeled for that month (August) of the 2001 meteorological year. While the results of the sensitivity analysis indicated a slight increase in the modeled criteria pollutant concentrations as well as the deposition and visibility impacts, it was determined by the Coronado that the results did not warrant a full rerun of the modeling for the Barrel Alternative (see the "Projected Effects on Deposition of Sulfur and Nitrogen on Class I Areas" part of this resource section, as well as table 51)."

There are several objections to cited material:

- The FEIS used data for 2001, although 2010 or 2011 would have been more appropriate. EPA guidance calls for the most recent five years of data, but makes provisions to use surrogate met data from previous years in certain circumstances if they are statistically shown to be comparable to present site data for the appropriate met parameters. No statistical analysis shows up in the background reports. The 2001 data are terribly outdated. Use of the 2001 data would also require the use of the 2002 and 2003 met data. These data have different distance scales (12km in one case, 36km in another case), which renders the surrogate met

data set statistically non-homogeneous and not suitable. Therefore, any calculations based on the surrogate met data set do not scientifically support decision making. These deficiencies of the early data were addressed in SSSR *et al* at 125-134, and apparently continue into the revised modeling.

- CALMET (the meteorology routine for CALPUFF) and CALPUFF were run for 2001, 2002, and 2003 using canned model forecasts as "pseudo observations" in CALMET. This means that AERMOD and CALPUFF were based on <u>two entirely different sets</u> of three year periods, and a statistically unsuitable met data set was indeed used. This kind of modeling inconsistency does not engender confidence and trust in any of the results.

- The last sentence of the quoted material makes no sense. The only clear implication for the FEIS to not have a full rerun of the modeling for Barrel Alternative is the time involved and monies saved. What is a criterion for a "slight increase?" Table 51 suggests an increase of 5-6%, but absent any explanations, that number under many circumstances could be considered more than "slight."

- The revised CALPUFF simulations also have problems of data management and handling, and inappropriate choices of data sources for background meteorological data – especially not using precipitation data from the RAWS network, incorrect choices of data on albedo and cloud cover. The revised CALPUFF modeling has not corrected basic problems cited with the original modeling, although the data situations are different.

- The FEIS uses several new descriptors for the numerical levels of deposition: the "deposition analysis threshold," the "critical loads," and the "incremental deposition" (FEIS at 276). Even with the new descriptors, the CALPUFF modeling showed that the FEIS favored Barrel Alternative has nitrate levels deposited in protected areas of Class 1 National Parks and Forests exceeding these "deposition analysis thresholds."

- The FEIS discussion of "deposition analysis" levels of any kind (or what some USEPA groups have called "alert levels") does not address the problem that these descriptors rarely have regulatory status or clout. They are observed parameters and are often used in the <u>absence</u> of regulation. If observed environmental levels can cause adverse effects, the regulatory scenario under these parameters is very limited. The FEIS must indicate explicitly what action the Forest Service can take if the numbers are not favorable.

- The CALPUFF modeling assessment of "incremental deposition" values is an unclear application. The FEIS does not evidence to show that this parameter has predictive value. Nor is it clear from the FEIS that this parameter and its measurements can support management decisions or conclusions about deposition problems.

Topic #18
VISCREEN

The FEIS (222) mentions VISCREEN modeling of visibility and opacity in a Class 1 area. VISCREEN modeling is new information since earlier release of the DEIS.

- VISCREEN modeling depends on and correlates outputs of applications of AERMOD. VISCREEN modeling therefore likely also suffers from previously described problems with AERMOD. Still, VISCREEN showed that even with poor AERMOD modeling, opacity and visual reductions are serious in Class 1 areas.

- The previous objection raises the question of the Rosemont Copper project being a PSD (prevent significant deterioration) source. If Rosemont Copper is a PSD source, then the current air quality permit allows a violation of the Clean Air Act secondary air standards.

- If ADEQ had considered Rosemont Copper a PSD source, that would have required modeling for an air quality permit with respect to deposition in Class 1 areas. A Class II air quality permit does not require modeling. Here again the Forest Service cannot rely on ADEQ or the air quality permit.

Topic #19
Because the original AERMOD and CALPUFF modeling was so faulty, the Forest Service should have considered a different and more comprehensive modeling platform for revised modeling.

Revised modeling is a new issue raised in the FEIS and not previously subject to public comment (FEIS 217). When the Forest Service required revised modeling, it should have considered the previous problems of using AERMOD and CALPUFF documented in DEIS comments (SSSR *et al* at 21, and 125-134), and sought a more sensitive and comprehensive modeling platform. Such a platform is HYSPLIT, available through NOAA (National Oceanic and Atmospheric Agency). HYSPLIT has greater capabilities than AERMOD or CALPUFF with regard to distance scales, atmospheric chemistry, handling aerosols, dealing with data statistical issues, and many other things. The problems with the revised modeling in the FEIS reinforce the need for something else and more effective.

Topic #20
The FEIS statement that the Rosemont project cannot cause areas of Pima County to become non-attainment areas for certain NAAQS standards is questionable.

SSSR (27 and 30) raised issues of NAAQS parameter exceedances following events

which resulted in high levels of particulate matter and carbon monoxide. This led Pima County to its initial decision to deny the air quality permit. ADEQ later issued a permit after taking over the jurisdiction from the County. The FEIS (264) states:

> "Comments from cooperating agencies suggested that the potential for the mine to contribute to non-attainment for PM_{10} status should be analyzed in some manner. Current maximum for PM_{10} concentrations observed in the Tucson area are summarized in Table 34 and range from 79 to146μg/m³. Concentrations of PM_{10} resulting from the mine have not been modeled at these specific points. However, concentrations modeled at the boundary of Saguaro National Park East have been and can be used as a rough approximation of concentrations some distance from the mine. PM_{10} concentrations at the boundary of Saguaro National Park East range from 1.9 to 3.7μg/m³, depending on the alternative NO_2/NOx ratio used (Table 46) for the Barrel Alternative, which is the only alternative that meets NAAQS at the fenceline. The modeled PM_{10} concentrations at Saguaro National Park East range from 2.2 to 2.8μg/m³. The NAAQS for PM_{10} is 150μg/m³.
>
> "A simple calculation suggests that the contribution from the Rosemont Copper Mine would not trigger non-attainment status. Like any emission source large or small, the Rosemont Copper Project would contribute to regional air quality, and emissions from the Rosemont Copper Mine would slightly increase the risk for non-attainment. It would not be appropriate to state, however, that Rosemont Copper would be responsible for or cause non-attainment should it happen, as current levels observed in at least one monitoring station are already close to the NAAQS."

There are several objections to this cited material:

- What is a "simple calculation?" What is a "slight" increase in the risk of non-attainment? The FEIS gives no criteria for "slight." Table 34 is inadequate in answering these questions.
- Why were the specific Tucson points which showed elevated PM_{10} levels not modeled? Data from these specific locations can trigger the non-attainment status based on past history. The last sentence of the quoted material falsely implies an anomalous situation for one Tucson site.
- The distance from the Rosemont site to Saguaro National Park has no credibility as approximating impacts at the locations not chosen in the previous item. The locations not chosen are impacted by many more sources of air pollution emissions than the Park. Further, what does "some distance" from the mine mean in this context? Ironically, Saguaro National Park was recommended by one of the Appellants in the air quality permit appeal hearing as a reference site, but was rejected by ADEQ and Rosemont because it had "too many influences" of the urban plume from Tucson, and was at a much lower elevation.
- The highest value of 146μg/m³ at a Tucson air quality monitoring site has an inherent statistical uncertainty of nearly an order of magnitude, because the formulas used to make this estimate have a logarithmic basis. Thus, a reasonable

minimum uncertainty range is ± 10μg/m³, and that value creates a real likelihood that particulate emissions from the Rosemont site would carry the numbers over the 150μg/m³ standard in the NAAQS. With this datum as background, statistically, this could happen with or without Rosemont incremental additions with as high as an 80% probability. However, neither ADEQ, nor Rosemont, nor the FEIS has looked at nor provided the uncertainties associated with any of their estimated numbers.

- Even if EPA declares some high wind events as "naturally occurring" and relieves regulatory authorities of dealing with the exceedance, the time it takes to receive such a response is often so long in coming. The Forest Service should be wise and plan for such naturally occurring events rather than rely on the "exceptional event" relief described in Appendix G, at G-27. The FEIS should provide measures to address these high wind events. Further, as of the time of this submission, EPA has not given an answer to the request, and this is more than two years since the request to EPA was made.
- Non-attainment triggers the State Implementation Plan for air pollution. The FEIS does not consider the impact of this change of regulatory environment on its decision to support the proposed mine project.
- The modeling of particulate levels at Saguaro National Park East does not appear to consider dust storms that have occurred in recent years produced by winds with speeds of up to 40-60 mph. Because the occurrence of such events has become expected, the data are not statistical outliers.
- The FEIS has indicated with the ADEQ class II synthetic minor permit having been issued, Forest Service actions are now considered outside of the air quality permit issues. It is not clear what USFS means because, if the permit is changed, then the USFS must reconsider every aspect of this issue and provide mitigating measures to reduce air pollution emissions further, including augmenting proposed mitigating measures in the air quality permit. These would need to be included in a new DEIS or Supplemental EIS for public review.
- The USFS must remove the following statement from the FEIS: "It would not be appropriate to state, however, that Rosemont Copper would be responsible for or cause non-attainment should it happen ...," The USFS cannot defend this statement in view of the deficiencies cited in many of the objections in this document.

Suggested remedies: First the FEIS must acknowledge that the project in its present form could trigger a non-attainment status for NAAQS standards for parts of Pima County. Then, the FEIS must rerun the modeling using higher levels of wind speeds and a frequency analysis of the high wind events to see if the results are still not a problem. If the rerun results confirm the likelihood of the Rosemont project causing a non-attainment situation, the Forest Service must provide mitigating measures in the project approval to prevent this over and above what is found in the air quality permit, or it condones violations of the Clean Air Act.

Topic #23

The issue of non-attainment of air quality areas is a cumulative effects issue which has not been evaluated in the FEIS

The possibility of causing a non-attainment area is a readily foreseeable event and subject to cumulative analysis evaluation under NEPA. Putting into effect the State Implementation Plan because of non-attainment status has major economic consequences for all air pollution sources in Pima County.

Topic #24

The FEIS allows the Forest Service to treat "exceptional" events in air pollution and meteorology in a dangerously deficient and dismissive manner.

The issue of extreme value statistics was raised in on page 24 of this document with respect to problems of revised air quality modeling. The revised air quality modeling is itself new information and the concern about extreme value statistics is a direct consequence of the FEIS narrative.

Extreme value statistics can address an issue raised in the comment section, Appendix G of the FEIS. The material looks at "exceptional events" (Appendix G, page G-27). The FEIS statements: "However, severe weather events could be categorized as Exceptional Events. Exceptional Events are unusual or naturally occurring events that can affect air quality but are not reasonably controllable using techniques that tribal, state or local air agencies may implement in order to attain and maintain the National Ambient Air Quality Standards. For particulate matter, these events can be the result of large fires, high winds, man-made events such as explosions, or natural events such as volcanic eruptions. In the southwest, high winds can accompany large storms (*e.g.* ,haboobs) that move across a regional or state-wide swath of land, or high winds can accompany "micro-bursts" with or without rain that descend on a small localized area. If the severe weather event is determined by the EPA Administrator to be an exceptional event, the event would not be considered an exceedance of the NAAQS."

The FEIS statement wrongly allows the Forest Service and Rosemont to consider as "exceptional" some events which objections in this paper have indicated will likely cause problems and which the FEIS has not dealt with adequately under NEPA. In so doing, Forest Service might avoid addressing the issue entirely. This kind of sleight of hand tactic by Forest Service is wrong.

The so-called "exceptional event" concerns include: (1) considering the use of explosives to release ore from the geological strata as an exceptional event, even if the air quality permit restricts the amount of explosives used daily; (2) treating the recent dust storms in Pima County which have caused problems with air quality exceedances of particulate matter as exceptional;. (3) ignoring the impact of the monsoons on air quality and water quality issues, especially with respect to the erosion of materials off the dry stack disposal; (4) considering the high value of a particulate measure as an outlier and requesting permission not to include it in dispersion calculations (something that was rightly refused). The FEIS has not indicated what is "reasonably controllable," a qualifier that may change depending on whether one is considering tribal, state or local agencies (the ones mentioned in the FEIS remarks). Further, the responses to requests of the EPA

Administrator to categorize certain events as exceptional may be a long time in coming. What happens in the interim? And all of these factors play into inadequacies of the air quality permit because of the time frames of reporting and response to potential exceedance-causing events. The FEIS must require sufficient mitigating measures to reduce the impacts in advance of such possible events, since they are expected and predictable.

WATER QUALITY

GROUNDWATER QUALITY AND GEOCHEMISTRY

Topic #25
The investigation into the potential for the mining process to concentrate naturally radioactive materials in the tailings is seriously flawed.

The first discussion of Technological Enhancement of Naturally Occurring Radioactive Materials (TENORM) in the FEIS appears in the "Groundwater Quality and Geochemistry" section of chapter 3. In the preliminary sections of the FEIS, TENORM is listed as a new issue which has previously not been commented on: "Potential impacts related to radioactivity and asbestos have been added to the FEIS. Potential impacts to air quality, soils, and ground and surface water from pollutants associated with the mine are disclosed in Chapter 3 of the FEIS. Specifically, the potential for Technological Enhancement of Naturally Occurring Radioactive Materials (TENORM) is addressed in the Groundwater Quality section of Chapter 3."

The FEIS states that in response to public comments, the CNF requested further investigation into "the potential for the mining process to concentrate naturally occurring radioactive materials in the tailings" (FEIS at 384).

> "The investigation focused on the ranges of uranium typically found in crustal-type rocks, the general concentrations by rock type generally found in the Rosemont deposit, the results of radionuclide and whole rock geochemical analysis conducted by Rosemont Copper on rock samples, and the solubility of uranium at the pH ranges expected to be encountered in the tailings. The most common source of radioactive materials is igneous intrusive and metamorphic basement rocks; as discussed above, compared with other deposits, these types of rocks are largely absent from the Rosemont deposit, although other types of rocks, including those present, typically also have lower levels of radioactivity. Geochemical analysis conducted by Rosemont Copper generally supported the finding that elevated levels of radioactive materials were not present. Mobility of any uranium present in the tailings was expected to be low, based on geochemical testing. Overall,

> the review found that the potential for technological enhancement of naturally occurring radioactive materials was adequately investigated and that the mineralized and unmineralized rocks present in the Rosemont deposit would not generate detectable concentrations of these materials in the resulting tailings (Kline *et al*. 2012)." (*Id.*)

The following are objections to material quoted from the FEIS:

- The statement: "Geochemical analysis conducted by Rosemont Copper generally supported the finding that elevated levels of radioactive materials were not present" is not scientifically supportable. Rosemont's geochemical data on the radioactivity contents of its ore source materials were seriously deficient and flawed. Among the many deficiencies were: (1) failure to characterize and quantify the thorium and lanthanide contents of the ores (thorium is found throughout geological strata in the Southwestern United States); (2) the number of ore samples for radioactivity testing and leachate studies were statistically inadequate: only 12 samples and only 1 of which was subject to leachate testing (statistically inadequate number both for radioactivity testing and leachate testing) and even this was an afterthought as indicated by reprinting email correspondence in the background geochemistry characterization reports when the analytical chemistry consultants raised the issue with Rosemont after some preliminary analytical work; (3) failure to analyze the mineralogy of the sample matrix rather than simply naming the source of the sample (challenges the FEIS quote with respect to which minerals contain the radioactive elements); (4) failure to correct radioactivity measurements back to the time of collection (a standard and necessary quality assurance provision); (5) failure to measure radon at the source and the time of original sampling (otherwise it gases off from the sample); and (6) even failure to include the radioactivity measurements in their ore composition tables – a fault that has yet to be corrected through revision or amendment of the background geochemical characterization report.

- The FEIS does not clearly, adequately or completely characterize "mobility" of uranium from the tailings. Uranium reaches the tailings after chemical treatment by sulfuric acid, sodium sulfide, and exposure to a chelating agent to extract copper which has a potential affinity to bind other metal elements. The chemical environment is highly acid even though the buttress wall surrounding the tailings pile is to be carbonate based rocky material which can potentially neutralize some of the acid if liquids migrate through the formation. The geochemical relationships to phosphates and sulfates in the tailings, as well as trace quantities of fluoride and chloride, are not explored (typical elements which give natural stable compounds of uranium in nature), nor are there geochemical correlations with other elements. The characterization of the tailings is still a work in progress, as noted by the FEIS in its comments on selenium (FEIS at G-65). See topic #27.

- The FEIS neither mentions nor addresses the mobility of radium. The background

geochemistry characterization gave data for radium. Radium has a +2 valence state, and uranium does not, making radium mobility vastly different from uranium.

- TENORM problems also arise because the Rosemont claim lies over a depleted uranium claim. A depleted uranium source with surface exposure or directly underlying the location where leaching is expected is a major source and cause of TENORM. Given this information, what does "elevated values" mean for material cited from the FEIS above?

- CNF cannot depend mainly on its consultant report Kline (2012). The report authors simply assumed that samples were handled properly. The authors never questioned the quality of the data, nor the quality assurance notes from the radioactivity analyses presented, nor noted the many deficiencies in the data given in the first objection on this item.

- The last sentence of the above-cited passage from the FEIS is contradicted by the background geochemistry characterization report. The only leachate sample reported in any specialized background radioactivity testing confirmed the presence of the uranium in the leachate and the ore, and its leaching potential, thus showing detectability.

- Further to the existence of a depleted uranium claim at the site, the TENORM issue has additional air pollution implications with respect to any disturbance of landscape through blasting or other processes. Also, the TENORM issue here creates a potentially hazardous work site, requiring radiation monitoring of all who enter, work or visit the site. The FEIS never addresses this situation.

- A radioactive substance present naturally at a given level in a stratum can still be an environmental hazard. A landscape disturbance can release it to the environment and make it toxicologically available whereas it might not be if trapped in undisturbed mineral strata.

Suggested remedies: The Forest Service must reevaluate the "mobility" of uranium and correct mistakes in its cited materials. Further, the Forest Service must quantify the "elevated levels" and then try to justify why they do not consider them of concern.

Topic #26
The FEIS has assumed the wrong position on the discussion of arsenic in groundwater

SSSR *et al* at page 53 noted an absence of a reference to treatment of arsenic, which under revised aquifer and groundwater regulations, in place as of 2008 nationally, reduced the allowable level of arsenic from 50μg/liter to 10μ/liter. Further, SSSR noted EPA's comments and cited them in that same comment section. The FEIS response: "The

Coronado considered the issue of the difference in arsenic standards between the USEPA proposed standard of 10µg/L and the existing State of Arizona standard of 50µg/L. The discrepancy is discussed in the EIS. However, the Coronado position is that the legal standard applicable in the State of Arizona (specifically the Arizona numeric aquifer water quality standards) is the appropriate threshold for this analysis."

The CNF position is not protective of human health. The aquifer provides potable water for human consumption and agricultural use. Therefore, the drinking water standard of 10µg/L to protect human health is the appropriate starting point. The State of Arizona will be forced eventually to change its aquifer standard to meet the EPA rule.

Suggested remedies: The Forest Service must reconsider its analysis and base it on the drinking water standard and not the current State of Arizona aquifer standard.

Topic #27
The FEIS has inadequately addressed the problems of selenium in groundwater and surface waters and their effects on wildlife

SSSR has addressed selenium issues (SSSR *et al* at page 60 and page 89). The FEIS comments appear in Appendix G, page G-65: "The Coronado has worked with their contracted geochemical experts to review the USEPA concerns regarding these two constituents (Hoag, Bird, and Day 2012; Hoag, Sieber and Rasmussen 2012, Kline *et al* 2012) and believes the analysis in the EIS is adequate and defensible. It should be noted that some uncertainty remains in the analysis regarding selenium, and the potential for stormwater runoff to have elevated selenium concentrations. As noted above, it is due in part to this uncertainty that the Coronado is working with Rosemont Copper to develop more thorough characterization of waste rock and tailings."

The following are objections to the FEIS response:

- The Forest Service should have required completion of this characterization of waste rock and tailings *prior* to release of the final EIS. To leave this important background informational step until after completion of review of the EIS prevents objections on the materials from specialists who are knowledgeable about selenium chemistry.

- The Forest Service officer should have taken a conservative or at least neutral stance with respect to the uncertainties listed in the comment above rather than rendering a positive decision which precludes any adjustments if the forthcoming selenium information is not favorable.

- What is the context of "defensible"? Is it scientifically supportable; capable of being upheld legally in a court room; or what? The statement is too speculative and syntactically questionable.

Topic #28
The FEIS discussion of modeling of Upper Cienga Creek lacks credibility because the time horizon chosen is too long

SSSR *et al* at 86 notes that the predicted reduction in stream flow along Cienega Creek is 1–3% and in stream length it is 2.1% and are called "minor" (page 265 DEIS). These two figures don't really match if a 1–3% reduction in stream flow can impact all the riparian habitat along 22 miles of creek and this should not be considered "minor". In Chapter 3, page 661 of the FEIS, the Forest Service noted, "A range of possible outcomes was assessed for Upper Cienega Creek. For several hundred years, most scenarios suggest that no noticeable changes in stream flow would occur. By 1,000 years after closure, several scenarios suggest that no noticeable changes in stream flow would occur, but several other scenarios suggest that there could be a transition from perennial to intermittent flow or from perennial to ephemeral flow. Although drawdown would be experienced, it is at levels such that no substantial change in riparian and aquatic vegetation along Cienega Creek is expected to occur as a result of the proposed mine, with the exception of scenarios at 1,000 years after closure in which the stream dries completely, which would affect aquatic vegetation. Some transitional vegetation at the margins of the hydroriparian corridor could convert from hydroriparian to xeroriparian habitat."

Except for models involving radioactivity, there is no credibility in running any model for 1000 year period after closure to predict ecological effects. Not enough is known about species interactions and behaviors, the effects of future climates, and other stochastic factors to give any credibility and support to such long time horizon extrapolations. Biological systems are highly non-linear, further complicating this kind of long term extrapolation. The same objection would apply to the other possible alternatives where such long term extrapolations of ecological effects are given in the EIS.

Topic #29
Final Suggested Remedial Action

The final suggested remedial action is: **That given the many flaws, errors, inappropriate assumptions, and faulty components of this FEIS, the Forest Service must go back to the drawing board and issue a new DEIS or Supplement EIS subject to public comment. The existing flaws and faulty analyses in this FEIS cannot assure that federal regulations on air quality and federal regulations on groundwater and drinking water resources will not be violated, and therefore the Forest Service must withdraw the Record of Decision to approve the Rosemont Copper Project.**

Appendices and Attachments:

1. SSSR comments on the DEIS
2. Reply Brief of Joel Fisher
3. Dr. Robert Maddox paper on scenic characterization