Objections: Final Environmental Impact Statement for the Rosemont Copper Project

A Proposed Mining Operation
Coronado National Forest
Pima County, Arizona

Forest Service – Southwestern Region
Coronado National Forest

Responsible Official: Jim Upchurch, Supervisor
Coronado National Forest

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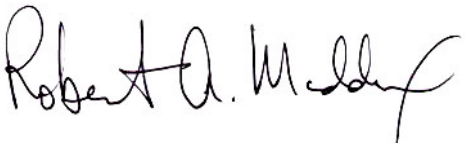
Signed  Date **February 9, 2014**

Preface

I submitted, as an individual, comments on the FS Draft Environmental Impact Statement (DEIS). My DEIS comments are included here as an attachment. Some portions of my DEIS comments have been extracted and included in the digital version of the FS Final Environmental Impact Statement (FEIS, online and on the CD included with the printed version of Volume 6 - Appendix G) within PCS 743 and 746. I am listed twice (as both Robert and Bob) in "Chapter 4. Consulted Parties" on p. 1241 of the FEIS.

I have proper status, as an individual, to object to portions of the FS FEIS.

ISSUE 1 - Incomplete Surface Meteorological Data and Poor Quality of Observations

MY DEIS COMMENT – 1.a (p. 4 and reference 3 of my DEIS comments, see attach. 1**) -** Data from the single, on-site weather station installed and operated by Rosemont consultants (there have been name changes for these companies and I will refer to them generically, except in direct references) are not adequate to quantify the meteorological conditions occurring over the complex terrain of the large project area. Therefore, statements in the monitoring protocol document are not correct.

FS RESPONSE in FEIS (1st concern top of p. G-27 of the FEIS documents) **–** This comment has apparently been blended with others and stated by USFS as a public concern: "The Coronado National Forest should revise the air quality analysis to include project area-specific wind data that incorporates the impacts of the canyon topography as well as any prevailing winds ..." However, the response implies that this concern has been addressed, but there has been no direct consideration of, nor response to, my comment.

OBJECTION - The FS edited statement of the problem does not address the inability of single site observations to categorize the meteorology of the large and orographically complex Rosemont site. The FS response does not address this concern and refers only to air quality modeling and the protocols used. There has been no consideration of observing methodology or my DEIS comment.

SUGGESTED REMEDIES - Installation of a number of weather stations at key locations, and at various elevations, is needed to document the meteorology of the project area. A complete categorization of the project area meteorology to support new modeling would also require that a wind profiler, or tether sonde, be operated onsite to document the depth of the actual mixed layer at the site. EPA guidelines state (my DEIS reference 19, p. 28, section 8.3.1.2 at http://www.epa.gov/scram001/guidance/guide/appw_05.pdf **:**

"For complex wind situations where site specific meteorological data are being relied upon as the basis for characterizing the meteorological conditions, a data base of at least 1 full-year of meteorological data is required. If more data are available, they should be used. Site specific meteorological data may have to be collected at multiple locations. Such data should have been subjected to quality assurance procedures as described in paragraph 8.3.3.2(a), and should be reviewed for spatial and temporal representativeness."

MY DEIS COMMENTS – 1.b (p 4 and Appendix C of my DEIS comments) - The on-site weather station is located about 4,000 ft (FEIS map shown on p-65, i.e., Fig. 9, indicates this distance is actually about 3,300 ft) east of the south-to-north ridgeline of the Santa Rita Mountains and approximately a mile north of a distinct west-to-east ridge. This is a sheltered location and is not representative of the entire project site.

FS RESPONSE in FEIS (p. G-27) **–** This comment has apparently been blended with others and stated by FS as a public concern: "The Coronado National Forest should revise the air quality analysis to include project area-specific wind data that incorporates the impacts of the canyon topography as well as any prevailing winds ..." (re 1st concern top of p. G-27 of the FEIS documents). This FS statement of the concern does not address the sheltered nature of the Rosemont weather station and there is no response to this issue in the FEIS.

OBJECTION – The FS does not address the sheltered location of the weather station on the Rosemont site. The FS response refers only to air quality modeling and the protocols used. There has been no consideration of my comment nor of the impacts that unrepresentative, light wind speeds would have on the Rosemont air quality modeling.

SUGGESTED REMEDIES - Installation of a number of weather stations at key locations, and at various elevations, is needed to document the actual surface winds that occur over the project area.

NEW ISSUE 1 (FEIS p. 225) – The FS FEIS states that: "Emissions of particulate matter resulting from wind erosion would be mitigated by constructing the [sic] perimeter buttress around the tailings facility using waste rock. The perimeter buttress would break up the air flow and reduce exposure of tailing facility to windy conditions (JBR Environmental Consultants Inc. 2011)." This proposed buttress was not mentioned in the DEIS.

COMMENTS ON THIS NEW ISSUE – I examined the FEIS reference listed at the end of the buttress sentences. I could find no technical information relating to this proposed or planned buttress around the dry stack tailings. However, this proposed action appears to be unfeasible. If a buttress were to reduce wind speeds across the entire extent of the proposed dry stack tailings, it would have to be at least 150 ft tall (see technical document from Penn State – attach. 2). Frankly, this proposal is absurd. A buttress of lesser height

would likely increase turbulence and particle scouring from the tailings at distances on the dry stack beyond 10 times its height.

SUGGESTED REMEDIES – None possible.

MY DEIS COMMENTS – 1.c (pp. 4-6 and several references of my DEIS comments) **-** The meteorological parameters observed at the Rosemont site were inadequate to support air quality modeling. On-site relative humidity, station pressure, solar radiation, and pan evaporation (important modeling inputs) had to be estimated using distant observational data that were likely not representative of the Rosemont site.

FS RESPONSE in FEIS – My concern is not mentioned in the hardcopy version of Appendix G in the FEIS or in the digital PCS 743 or 746. There has been no FS response to this concern.

OBJECTION – This comment has not been considered, nor responded to, by the FS as a public concern. Note that an evaporation pan was added to the observing site in August (FEIS, Table 32, p. 238); however, there is no explanation, nor reference given, for how the estimated pan evaporation at the site was determined (right-most column of the table).

SUGGESTED REMEDIES – The project site should be comprehensively monitored for at least a year with several well-located, up-graded weather stations, as well as new sensors that would directly measure the wind profiles aloft and the depth of the mixed layer. The new data should be used within new AERMOD forecasts, or forecasts driven by a more advanced and higher resolution model.

MY DEIS COMMENTS – 1.d (pp 6-7, my DEIS Comments) **-** The meteorological monitoring at the Rosemont site was conducted by Rosemont consultants, and they prepared a quality assurance plan (see reference 3 from my DEIS comments) for the on-site weather station and its data. This plan was not followed consistently. Furthermore, the six-month audits of the meteorological data were reviewed internally by Rosemont consultants, who could hardly be considered as independent reviewers, as is required by EPA guidelines (see my DEIS comments pp 6-7 and related references 19 and 20).

FS RESPONSE in FEIS – My concern is not mentioned in the hardcopy version of Appendix G in the FEIS or in the digital PCS 743 or 746. There has been no FS response to this concern.

OBJECTION – The site logs for the meteorological observing station (reference to Rosemont Copper Company 2012d, FEIS p. 1390) indicate periods through 2011 when the required status checks of the on-site weather station were not made for periods of 3 weeks to longer than 2 months. The quality assurance plan was not followed during the entire monitoring period. My DEIS comment has not been directly considered, nor responded to, by the FS as a public concern.

SUGGESTED REMEDIES - The FS should not accept the on-site meteorological observations, since procedures followed by Rosemont consultants did not conform to EPA guidelines, nor to the consultants own quality assurance plan.

NEW ISSUE 2 (refer to wind roses that are new and/or contain new data, FEIS Fig 39, p 237; Figs 3.2, 3.3, and 3.4 in FEIS reference JBR 2012b) – Wind data completeness is not clearly and consistently stated within the FS FEIS and newly updated modeling protocol documents referenced by the FEIS (above references and related text). The site logs for the meteorological observing station (reference to Rosemont Copper Company 2012d, FEIS p. 1390) indicate a data logger failure on 09-07-2007 but not how much data were lost.

COMMENTS ON THIS NEW ISSUE - There is still confusion between the FEIS and the referenced consultant reports regarding what surface data from the Rosemont site were actually used for the FEIS and what the data completeness was. On p. 237 of the FEIS a wind rose for 2008 is shown in Fig. 39. The Fig. indicates that 23 hours of data were missing during 2008. The JBR December 2012e report (referenced in the FEIS p. on p 1374) indicates that only 9 hours of data were missing during the entire 3-year data period used in the revised AERMOD modeling work.

SUGGESTED REMEDIES – Amend, or provide *errata*, for the FEIS to explain and resolve the data accounting problems.

ISSUE 2 – Other Data Sources: Problems and Omissions

MY DEIS COMMENTS – 2.a (see pp 3-6 of my DEIS comments) **–** Observational data were used in developing the final modeling results reported in FEIS Chapter 3 from a number of distant sites having limited direct relationship to the Rosemont project area. These observations are not representative of the Rosemont site. The situation exists because of the failure by Rosemont consultants to measure and observe the needed meteorological parameters at the project site, as per My FEIS objection 1.c, and suggested remedies above.

FS RESPONSE in FEIS – The FS PCS 746 (concerns number 1 and 2, p. 1) refers peripherally to my DEIS concerns. However, there has been no direct FS response to these concerns.

OBJECTION - The sites used for revised FEIS modeling and characterization of the Rosemont site are mostly west of the Santa Rita Mountains in the lower elevation, and drier, meteorological regime of the Santa Cruz River watershed. The only site among those used that could be considered somewhat similar to the Rosemont site with respect to small-scale weather and climate is the Santa Rita Experimental Range. The lack of representative and suitable meteorological observations (except for the nearby RAWS and ALERT stations, which were NOT used) for air quality modeling of the Rosemont site should have been recognized before the inadequate observing strategy was implemented by Rosemont consultants. My DEIS comment has not been directly considered, nor responded to, by the FS as a public concern.

SUGGESTED REMEDIES – The project site should be comprehensively monitored for at least a year with several well-located, up-graded weather stations, as well as new sensors that would directly measure the wind profiles aloft and the depth of the mixed layer at the site. Regional weather data observations from all available and relevant surface observation sites within southeastern Arizona, including RAWS, other NWS stations, and the Pima County ALERT network (http://rfcd.pima.gov/wrd/alertsys/index.htm - see attach. 3) must be considered. The resulting data should be used within new air quality model forecasts, preferably within a more advanced and higher resolution numerical framework.

MY DEIS COMMENTS – 2.b (see pp 7-8 and 16; also see Figs. 3 and 9 of my DEIS comments; copy attached) **–** Nearby Remote Automated Weather Stations (RAWS –see my DEIS comments reference 10) have not been used or considered by Rosemont and its consultants, even though these stations provide the closest and most comprehensive surface observations available. These nearby RAWS stations are part of a cooperative, multi-agency, network of automated weather stations. Both the **FS** and the Bureau of Land Management are partners in this interagency program. The following description of the program is from the RAWS webpage (see attach. 4):

http://raws.fam.nwcg.gov/index.html

"There are nearly 2,200 interagency Remote Automated Weather Stations (RAWS) strategically located throughout the United States. These stations monitor the weather and provide weather data

that assists land management agencies with a variety of projects such as monitoring air quality, rating fire danger, and providing information for research applications."

Six of these RAWS stations in southeastern Arizona are within, or very near, to Arizona Class I areas. The basic RAWS sensor suite includes a rain gauge; anemometer; wind vane; air temperature and relative humidity sensor; barometer; and a pyranometer to monitor global solar radiation (which indicates total cloud cover and thickness). The Empire RAWS station is the only comprehensive, meteorological, surface observation station located in the critical Cienega watershed, and is approximately **7 miles east-southeas**t of the Rosemont project area.

FS RESPONSE in FEIS – These comments have been peripherally referred to in the digital version of FEIS (PCS 746, p. 4), but have not been stated as a public concern, except in regard to their not being input into the CALMET/CALPUFF modeling procedures (Concern 6). The USFS response, Chapter 3 of the FEIS, and the Rosemont consultant reports (referenced in the FEIS) regarding model protocols do not address this critical omission of RAWS data within all work related to the FEIS.

OBJECTION – The important surface observations from both the nearby and regional RAWS stations must be included in the air quality and visibility modeling (CALMET/CALPUFF) for the FEIS**.** The FS must not ignore the important observations from a program it helps support. My DEIS comment has not been directly considered, nor responded to, by the FS as a public concern.

SUGGESTED REMEDIES - Incorporate regional RAWS weather data observations from all available surface observation sites within southeastern Arizona into new runs of the CALMET/CALPUFF model.

ISSUE 3 – Rosemont's AERMET and AERMOD Modeling Is Flawed by Serious Errors

NEW ISSUE 3 – The FS responses to my concerns imply that model protocols were changed via a number of undocumented conference calls and that modeling done used the best available science. However, new versions of AERMET and AERMOD were released by the EPA in December 2012, before the revised modeling was done by Rosemont consultants.

COMMENTS – The details of the revised protocols are impossible to determine by reading the FEIS and relevant references. The conference calls do not appear to be part of the public record. However, **new versions** of both AERMET and AERMOD were released in 2012 (Versions 12345 – see attach 5, model change bulletins MCB # 3 and MCB # 8). The new versions of the models should have been used, but the FEIS and relevant references don't inform the reader as to exactly what versions of the models were used. Lisa Willing of Wenck Associates posted a caution on December 21, 2001, alerting model users that the new Versions 12345 could require users to redo all modeling that was underway with AERMET and AERMOD (see last page of attach 5).

SUGGESTED REMEDIES – The FS must require that the latest versions of the air quality models were used in the new forecast runs. If this was not the case, Rosemont's AERMET and AERMOD results must be rejected. Additionally, the FS should provide an *errata* to the FEIS specifying exactly what were the changes made before the AERMET and AERMOD models were rerun for the FEIS.

MY DEIS COMMENTS – 3.a (pp 8-13, my DEIS comments) **–** Before running the AERMOD model the user (in this case Rosemont consultants) must specify the surface and precipitation character of the project area near the meteorological observing site. Rosemont consultants used a help tool developed by the EPA – AERSURFACE User's Guide (reference 14 in my DEIS comments; see attach 6). Physically unrealistic values for the character of the site were assigned by Rosemont consultants.

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION - The inputs into this help tool by Rosemont consultants indicate that they were either inexperienced with AERSURFACE, or had not visited or studied the physical character of the site. The choices made to set up key parameters were completely inappropriate for the Rosemont site (refer to Table 3.1 in FEIS, reference to JBR Evironmental Consultants, 2012b, or Table 1 in my DEIS comments). The unrealistic and inaccurate AERMOD parameter settings **remained unchanged** in all the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.b (Table 1 on p. 9 of my DEIS comments) – The data presented by Rosemont's consultants indicate that the surface character of the site was set to shrubland-arid for all years and seasons.

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – The land surface character data that are linked to AERSURFACE are from NLCD92, which has been updated twice since 1992. Even the crude 1992 data indicate that the site is both shrubland and interspersed evergreen forest. The most simple, default settings used by Rosemont's consultants characterize the entire Rosemont site as arid (i.e., desert) shrubland. A photographic assessment of the site illustrates dramatically that the desert shrubland characterization is seriously inappropriate – see **http://tinyurl.com/m8gm7xy - or** see attach. 7.

The **FS itself** (FEIS p. 787) describes the project area landscape as follows:

"In the lower elevations within and surrounding the project area, the landscape includes rolling hills, where lines from light-colored grasses of the savannas contrast with the trees and shrubs within the woodlands and rocky outcrops along the ridge. Landform features include converging lines from gentle, undulating slopes and the jagged, sharp skyline of the Santa Rita Mountains. In the bottom of drainages, vegetation typically includes very large oak and walnut trees, and where water is more plentiful, riparian species such as cottonwoods."

The site is definitely not desert shrubland. Recent information (obtained from the FS, only after a **FOIA** filed by the Arizona Daily Star) indicates that Rosemont will harvest 300,000 **juniper and oak trees** from the site. Such a tree harvest is impossible on desert shrubland (see attach. 8).

However, the botched AERMOD parameter settings remained unchanged in all the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.c (Table 1 on p. 9 of my DEIS comments) – The data presented by Rosemont's consultants indicate that they defined the seasons at the Rosemont site to be standard U.S. seasons.

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – Because of the summer monsoon rains (July – September) and the pre-monsoon hot and very dry period (April – June), the seasons at the Rosemont project area are not standard, as per the U.S. season definitions in AERSURFACE (see Table 1 in my DEIS comments, or Table 2.2 in AERSURFACE). Rosemont consultants should have run the AERMOD model for each month in the data set, or defined appropriate seasons for the site – AERMOD is versatile and allows the user these options. All of the unrealistic and inaccurate AERMOD parameter settings remained unchanged in the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.d (Table 1 on p. 9 of my DEIS comments**)** – The data presented by Rosemont's consultants indicate that they defined the entire year at the Rosemont site to be arid.

FS RESPONSE in FEIS – My DEIS concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – Rainfall data presented in the FEIS (see Table 30 of FEIS on p 235) indicate that the site experiences two wet periods one in winter and one in summer, with arid conditions during the other months. The summer monsoon is a very wet period and rapid greening occurs as grasses on the site grow rapidly. The **FS** itself describes the site as experiencing summer and winter rainy seasons (FEIS p. 787, last paragraph). The unrealistic and inaccurate AERMOD parameter settings remained unchanged in all the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

NEW ISSUE 4 – (Table 1 on p. 9 of my DEIS comments and AERSURFACE User's Guide – attached) – Since all the AERMOD modeling was redone for the FEIS, new comments can be made. The AERSURFACE User's Guide (p. 6, top – the guide is attach. 6) indicates that surface moisture conditions at the site must be determined relative to climatological normals. If monthly or seasonal precipitation amounts, relative to long-term climatological values, vary during the data period to be processed, AERSURFACE may have to be applied multiple times. Data in FEIS Table 30 (p. 235) indicate that several ***correctly defined seasons*** used in the modeling may have been "wet" and that several may have been "dry"

COMMENTS – AERMOD was run by Rosemont consultants with the rainfall for all months of the entire three year data period set to "average" (AERSURFACE User's Guide, 2008, copy attached, defines average as plus or minus 30% relative to the long term climatological value of precipitation - by month or by ***correctly defined seasons*** at the site – see p. 6 of the user's guide)**.** This is a problematic issue, since seasonal precipitation for the long term has not been well-established for the site.

Rosemont consultants (see FEIS reference Carrasco, J. 2009, p. 1359) concluded that annual rainfall was about 18 inches (based on records from Nogales, Arizona) across **the entire Rosemont project area**. The Oregon State University PRISM system (see attach 9) is the accepted, state-of-art procedure for estimating rainfall in complex terrain. This system utilizes **all nearby rain observations** (e.g., the Empire RAWS data) and incorporates elevation, slope and aspect for each grid point. See: http://prism.nacse.org/ At 800 m grid resolution the PRISM data indicate average annual rainfall (for the period 1971-2000) at the Rosemont site varies by almost 4 inches from lowest to highest elevations on the site (which is the reason for the marked changes in landscape across the site – see other objections in this section). **Note that PRISM is supported by the USDA and that the USFS is an agency of the USDA.** It is likely that some periods should have been classified as either "wet" or "dry" and that the assumption that the entire three-year period modeled within AERMOD was "average" was not correct.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.e (my DEIS comments, p. 9) – AERSURFACE (p.6 – attached) allows the user to define sectors to determine the surface roughness accurately within 1 km of the observing site. This was not done by Rosemont consultants.

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – The terrain elevation changes dramatically between the Rosemont weather station and the ridgeline of the Santa Rita mountains that is less than 1 km to the west of the station. Surface roughness should have been determined for at least two sectors. AERMOD results are strongly impacted by the values defined for surface roughness (my DEIS comments, p. 9 and DEIS reference 15 – see attach 10). All of the unrealistic and inaccurate AERMOD parameter settings remained unchanged in the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related

to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.f (my DEIS comments, p. 9) – Rosemont consultants have used erroneous values of the Bowen ratio in their AERMOD modeling (see Table 1 in my DEIS comments and p. 6 in the AERSURFACE User's Guide – both are attached).

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp. 3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – Table 1 (my DEIS comments) indicates that Rosemont consultants choose Bowen ratios for desert shrubland and normal U.S. seasons. Neither are appropriate for the actual site. The lowest Bowen ratio should occur during the summer monsoon's wet, rainy period and the highest (approaching a value of 10) occurs during the hot and dry, pre-monsoon months (April-June). Table 1 indicates that Rosemont consultants chose a completely unrealistic Bowen ratio of 2.88 for the hot, dry spring months when the actual value is probably close to 10. AERMOD results are strongly impacted by the values defined for Bowen ratio (my DEIS comments p. 9 – see attach 10). <u>All of the unrealistic and inaccurate AERMOD parameter settings remained unchanged in the additional, new modeling done to support the FEIS.</u>

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

MY DEIS COMMENTS – 3.g (my DEIS comments, p. 9) – Rosemont consultants have erroneously set the albedo as a **constant**, appropriate for desert shrubland, through the entire 3-year period of data input into the model.

FS RESPONSE in FEIS – My concerns with inappropriate parameter settings in AERMOD were noted (PCS 746 pp3-4) and were included as part of the Concern statement, i.e., concern number 5. The FS response implies that my concerns were addressed by protocol revisions for the final Rosemont modeling. This deceptive and inaccurate response is NOT acceptable.

OBJECTION – The albedo is not constant at the site through the course of the year (the monsoonal greening that occurs regionally over southeastern Arizona is well-documented in the scientific literature). AERMOD results are strongly impacted by the values defined for albedo (my DEIS comments, p. 9, and attach 10). My DEIS comments illustrated the yearly monsoonal greening (i.e., distinct change in surface albedo) with satellite images showing vegetation greenness (Fig. 4 my DEIS comments – centered on the Rosemont project area).

The **FS** description of the Rosemont site (FEIS, last paragraph on p. 787) verifies that the albedo changes dramatically during the year:

"Landscape colors are greatly affected by season, precipitation, and variation in lighting, sun angle, dust, air quality, and distance. Grasses and savannahs are typically bright green during summer and winter rainy seasons but tend to be golden yellow during the drier parts of the year. Dark green

evergreen trees contrast with the grasses. Rock colors are generally weathered, light to dark in hue, broken, and mottled. Light-colored elements such as roads, talus fields, and disturbed soils tend to contrast sharply with other landscape colors."

All of the unrealistic and inaccurate AERMOD parameter settings remained unchanged in the additional, new modeling done to support the FEIS.

SUGGESTED REMEDIES – The modeling results are not valid for the Rosemont site and must be rejected. Because of the non-linear character of AERMOD, the impact of the bad parameter settings (i.e., those related to seasons, landscape type, surface moisture, Albedo, Bowen Ratio and Surface Roughness) can not be evaluated piecemeal. The parameters must **all** be set properly before any new AERMOD forecasts can be evaluated. The most desirable remedy would be new air quality forecasts from a more advanced model.

NEW ISSUE 5 – (Section 4.7, pp. 27-28, of the FEIS reference JBR Environmental Consultants Inc., 2012e) The period of on-site observations used in the AERMOD modeling has been changed to include three continuous years of surface observations. The wind roses used to characterize the Rosemont site have been changed and are subject to new comments. Rosemont consultants have argued in Section 4.7 that the Rosemont wind roses, when compared to the Tucson airport's wind rose, indicate that the airshed of the Tucson metropolitan area and the I-10 corridor are physically and meteorologically isolated from the local airshed at the project area. This argument is used to justify the use of background levels of pollutants from distant sites.

COMMENTS - Rosemont consultants state in Section 4.7 that:

"Transport of emissions to the Rosemont site from Tucson and Interstate 10 (I-10) to effect background concentrations at the site is highly unlikely as illustrated by wind roses for the Rosemont site (Figures 3.2 through Figure 3.4) and for the Tucson airport (Figure 4.1)."

The Rosemont consultants have tried to infer complex, 4-dimensional air parcel transports from simple (i.e., single point and single vertical level) wind roses. This entire section is simply not meteorologically correct or defendable, nor is it appropriate to the very complex terrain of the Rosemont site and the nearby Sky Islands. This entire section amounts to naive hand-waving, without any sound meteorological evidence presented in support of the arguments made. The Rosemont consultants claim that the Tucson metropolitan area and the I-10 corridor are isolated meteorologically from the Rosemont site is completely unsubstantiated.

I have examined this issue making use of the state-of-art HYSPLIT – Hybrid Single Particle Lagrangian Integrated Trajectory Model developed at NOAA's Air Resources Laboratory (see attach. 11) (http://www.arl.noaa.gov/HYSPLIT_info.php). This model enables the user to examine 4-dimensional air parcel trajectories produced by a number of forecast models. I have computed parcel trajectories, from 3 sites, each day for four months during 2009 (360 separate trajectories from 120 days) and reported the results in a brief report that is available at http://www.squidinkbooks.com/madweather/pdfs/HYSPLIT-analysis-of-air-flows-re-Rosemont.pdf (see attach. 12).

The results indicate that interactions between the airsheds of metropolitan Tucson/Green Valley, Saguaro NP East and the Rosemont project area occurred, within 500 m of the surface, on 62 percent of the days studied. Interactions between Rosemont and the I-10 corridor northeast of the project area were also found. It is significant that stable, low-level air parcels moved north and northwestward from Rosemont, **crossing portions of the Tucson metropolitan area** before sunrise on 31 of the days studied (i.e., about 26 percent of the time).

SUGGESTED REMEDIES – A meteorologically sound, re-evaluation of appropriate background pollutant concentrations must be done using state-of-art, 4-dimensional parcel trajectory models. This remedy applies as well to CALMET/CALPUFF air quality modeling.

ISSUE 4 – CALMET/CALPUFF Modeling Procedures Were Not Properly Followed

MY DEIS COMMENTS - Concern 4.a (my DEIS comments p 13) **–** Although the EPA prefers that CALMET/CALPUFF modeling be done using data from the most recent 5 year period, the agency will accept a shorter three year period of analysis, if mesoscale models have been used to forecast "pseudo-observations". Rosemont consultants used easily available, canned MM5 forecast data for the years 2001, 2002, and 2003 to drive CALMET but did not evaluate the pseudo-observations against actual meteorological observations.

FS RESPONSE in FEIS - These comments have been referred to in the digital version of FEIS (PCS 746 p. 3 and 4), and have been noted briefly as a public concern (item 9, PCS 746). The USFS response, Chapter 3 of the FEIS, and its referenced Rosemont consultant reports regarding model protocols do not address these concerns. The FS "Response" is deceptive in that it implies that all 9 listed issues of concern have been addressed.

OBJECTION - It is an EPA regulatory requirement that the acceptability of the three years of MM5 prognostic data be established through demonstration of statistical comparisons with observations of winds aloft and surface observations (GAQM- Section 9.3(c); my DEIS reference 1). There is no indication within the final CALPUFF report (FEIS reference JBR Environmental Consultants Inc., 2012c on p. 1374) that such comparisons of the MM5 predictive, pseudo-observations were made with actual meteorological observations from southeast Arizona. My concerns stated above have not been directly addressed.

SUGGESTED REMEDIES – The FS should not accept the CALMET/CALPUFF model results presented by Rosemont because there were no statistical comparisons between MM5 forecast "observations" and actual observations, including RAWS and other NWS and ALERT sites within the CALMET/CALPUFF domain (Fig. 8 of my DEIS comments).

MY DEIS COMMENTS - Concern 4.b (my DEIS Comments pp. 13-14) **–** The forecast "observations" used in CALMET were all made using old versions of the MM5 (PSU/NCAR) model at coarse resolution. The forecasts for 2001 and 2003 were made on a 36-km grid; whereas, the 2002 forecasts were made on a 12-km grid. None of these forecasts can resolve key orographic features on and near the Rosemont site (Fig. 7, p. 14 my DEIS comments and related text).

FS RESPONSE in FEIS - These comments have been referred to in the digital version of FEIS (PCS 746 p. 3 and 4), and have been noted briefly as a public concern (item 9 in PCS version). The FS response, Chapter 3 of the FEIS, and its referenced Rosemont consultant reports regarding model protocols do not address these concerns. The FS "Response" is deceptive in that it implies that all 9 listed issues of concern have been addressed.

OBJECTION - The forecasts produced by CALMET/CALPUFF were for a completely different three-year period than were the AERMOD forecasts. The resolutions of the MM5 forecasts are too coarse to resolve the complex terrain of the Santa Rita Mountains or of the project site (refer to Fig. 7 of my DEIS comments, p. 14, copy attached). The model "observations" used as input for CALMET were from an inhomogeneous, low resolution data set and introduced additional uncertainty into the air quality model evaluations. My concerns stated above have not been directly addressed.

SUGGESTED REMEDIES – The FS should require Rosemont to use high resolution, mesoscale model forecasts from April 2007 through March 2010 to provide the input "observations" for CALMET/CALPUFF.

MY DEIS COMMENTS – 4.c (my DEIS comments p 14**)** - The 3 years of model forecasts used within CALMET exhibited substantial problems over the Southwest

FS RESPONSE in FEIS - These comments have been referred to in the digital version of FEIS (PCS 746 p. 3 and 4), and have been noted briefly as a public concern (item 9 in PCS version). The USFS response, Chapter 3 of the FEIS, and its referenced Rosemont consultant reports regarding model protocols do not address these concerns. The FS "Response" is deceptive in that it implies that all 9 listed issues of concern have been addressed.

OBJECTION - Kemball-Cook et al. (reference 17 in my DEIS comments, see Section 4 of their report at http://pah.cert.ucr.edu/aqm/308/reports/mm5/DrftFnl_2002MM5_FinalWRAP_Eval.pdf) noted that the MM5 forecasts from the early 2000s were better for winter than summer, over the Southwest. The model forecasts produced excessive amounts of summertime rainfall over the Southwest. The over-forecasts of rainfall can have serious repercussions for air-quality modeling, due to excessive "wash out" of pollutants. My concerns stated above have not been directly addressed.

SUGGESTED REMEDIES – The FS should require Rosemont to use high resolution, mesoscale model forecasts from April 2007 through March 2010 to provide consistent input "observations" for CALMET/CALPUFF.

MY DEIS COMMENTS – 4.d (my DEIS Comments p 15 and 16) **–** Very limited surface data were blended with the model "observations" for 2001-2003.

FS RESPONSE in FEIS - These comments have been referred to in the digital version of FEIS (PCS 746 p. 3 and 4), and have been noted briefly as a public concern (item 9 in pdf version). The USFS response, Chapter 3 of the FEIS, and its referenced Rosemont consultant reports regarding model protocols do not address these concerns. The FS "Response" is deceptive in that it implies that all 9 listed issues of concern have been addressed.

OBJECTION – Within the large CALMET domain (see Fig. 8 of my DEIS comments), surface meteorological observations from only 4 stations and precipitation data from only 7 stations (see pp. 11 – 12 of FEIS reference JBR Environmental Consultants Inc., 2013b) were blended with the model forecast data. **None of the RAWS data were incorporated into CALMET**. The 2013 CALPUFF report (see p. 12 of FEIS reference JBR Environmental Consultants Inc., 2013b) provides information on the weighting-function settings used to blend actual observations with the MM5 model predicted "observations", both aloft and at the surface. The weighting-functions indicate that, because of the small number of actual observations used, large portions of the CALMET domain were dominated entirely by the crude-resolution MM5 model forecasts. My concerns stated above have not been directly addressed.

SUGGESTED REMEDIES – The FS should require Rosemont to use high resolution, mesoscale model forecasts from April 2007 through March 2010 to provide consistent input "observations" for CALMET/CALPUFF. All available meteorological observations, including RAWS sites (refer to my DEIS comments pp. 7-8 and pp. 15-16, and Fig. 9, copy attached) should be blended with the model forecast "observations.'

MY DEIS COMMENTS – 4.e (see my DEIS comments p.17) - EPA guidelines and cautions were not adequately considered or addressed within the air quality modeling efforts conducted by Rosemont consultants.

FS RESPONSE in FEIS - These comments have not been referred to in any version of FEIS Appendix G.

OBJECTION - In 2003 the EPA (my DEIS comments reference 18, p. 455, Sect. 2.1) provided a number of cautions for potential users of air quality forecast models These cautions are extremely relevant to the modeling efforts that were attempted by Rosemont consultants.
(http://www.epa.gov/scram001/guidance/guide/appw_03.pdf). For example:

"The extent to which a specific air quality model is suitable for the evaluation of source impact depends upon several factors. These include:

(1) The meteorological and topographic complexities of the area…..
.
.
(5) the detail and accuracy of the data base, i.e., …[the] meteorological data.

Appropriate data should be available before any attempt is made to apply a model. A model that requires detailed, precise, input data should not be used when such data are unavailable……

The need for specialists is critical when the more sophisticated models are used or the area being investigated has complicated meteorological or topographic features."

My concerns stated above have not been directly addressed.

SUGGESTED REMEDIES – The air quality modeling results from Rosemont consultants are too flawed to be considered and they should be rejected by the FS. The FS should require Rosemont to redo all modeling (including that with AERMOD). A consistent period, April 2007 through March 2010, should be used in all new modeling efforts.

NEW ISSUE 6 – The FS asserts (FEIS Appendix G, p. G-25 and again on p. G-26, and also in PCS 736 and 746) that: "The modeling conducted and used for analysis in the FEIS uses this protocol, and the Forest has determined the techniques used represent the best available science,..."

COMMENTS - There is nothing in the FEIS to substantiate this statement, nor is there any explanation of how the FS determined that "...the best available science..." was used. Most of my objections here demonstrate that best available science was not used, and that the modeling results are highly flawed.

SUGGESTED REMEDIES – The overly simplistic and crude modeling results provided by Rosemont consultants must be rejected and all air quality modeling redone using best available scientific procedures and state of art air quality models.