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Re: Comments and Questions regarding the BA, RI and FS documents developed for the WSSRAP

Dear Mr. McCracken:

I have been asked by St. Charles Countians Against Hazardous Waste (SCCAHW) to provide an air quality review of the following documents prepared for the Chemical Plant Area involved in the Weldon Spring Site Remedial Action Project (WSSRAP):

Baseline Assessment (BA)
Remedial Investigation (RI)
Feasibility Study (FS)

This review was undertaken as part of the Technical Assistance Grant (TAG) that has been awarded to SCCAHW.

My particular professional expertise is in air quality monitoring with specific experience over the years (since 1974 as an air quality consultant) in air monitoring program design and management, perimeter air monitoring at Superfund cleanup sites, various air transport and transformation studies for EPA, and a listed participant in EPA's Radon Measurement Proficiency (RMP) Program both as an individual and as president of a corporation that is both a primary and secondary RMP Laboratory. I am also registered in Illinois for radon detection services with the Illinois Department of Nuclear Safety's Radon program (#RNI91006).

It is from this perspective and background that the above documents were reviewed for their consistency with good professional practice regarding air quality issues and the

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impact of air quality on the surrounding public access areas. I will group my comments by document and section as appropriate. There are some interconnected issues that are best raised as topics of concern which are addressed in several sections of one or more documents. Those focused comments are grouped without regard to sequence in any one document.

I trust that these comments will focus your attention on various air quality issues that do not appear to be consistently, thoroughly or properly addressed in these documents.

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GENERAL COMMENTS:

- These documents do not, in general, address air quality issues with anywhere near the detail and attention developed for the water and soil on-site despite several comments that radon gas is a serious health concern.

- In particular these documents do not recognize and reflect the fact that the most direct radon exposure route for the general public will be during remediation activities. Yet long term health issues addressing 30 year exposure to trespassers and recreational visitors receive most of the attention in the BA, RI and FS health assessments.

- There is a puzzling lack of use, and almost an ignoring, of on-site meteorological data gathered since the spring of 1990. Such information would be most helpful in evaluating current site conditions and, more importantly, in developing an emergency response plan. Such a plan should be based on real time modeling with current meteorological data to assist in decision-making.

BASELINE ASSESSMENT:

In 5.2.3 the "sitewide air exposure" estimate rationale is developed. The sources of the radiological risk are specifically focused on radon-222 and its short-lived decay products. Specific sources mentioned include 1) "radium-226 in surface soil" and 2) "contaminants generated from soil at the southern end of the site."

QUESTION BA-1: Why are the on-going radon emissions from the quarry ignored despite some of the highest ambient radon levels being measured in the vicinity of the quarry? [I am referring to the third quarter data from locations 1001 and 1002 during the third quarter of 1988, the only data available to me at this writing outside RI Table 5.6.]

In 5.2.3.1 results of the "location-specific analysis indicates that the maximum risks from inhalation are $2x10^{-2}$ for the worker, $4x10^{-5}$ for the trespasser, and $2x10^{-3}$ for the recreational visitor. Inhalation of radon-222 decay products accounts for more than 99% of the risks."

COMMENT: EPA risk levels of $1x10^{-6}$ (i.e. one-in-a million) are considered a rough guideline for acceptable cancer risk. These levels are appreciably higher despite being based on unrealistic exposure estimates.

QUESTION BA-2: Why were the off-site occupants of the Francis Howell High School (FHHS) not evaluated as a more seriously exposed population than the "recreational visitor" here and in FS Appendix E?

The reason for the above concern is the inconsistency between the "recreational visitor" potential exposure (from 6.2.2 his exposure is based on 20 visits per year of 4 hours each or 80 person-hours exposure per year over 30 years) and the current, actual FHHS population's exposure (approximately 2,000 people per day for 6 hours/day during 36 weeks per year or 2,160,000 person-hours exposure per year.) The FHHS population is located closer to the site than 2 of the 3 Busch Wildlife Lakes which would be visited by the recreational visitor in the future AFTER remediation has been completed while FHHS will be present DURING much of the remediation activity that will be generating elevated radon-222 emission. With this vast exposure difference AND the already high risks computed for the "recreational visitor," Question BA-2 deserves an answer, explanation and parallel risk calculations to support a response!!

In 5.6.2.1 the comment is made that "because measured values needed to assess the inhalation pathway at the site were not available, airborne contaminant concentrations were modeled to estimate exposure point concentrations." Later in the same paragraph there is the statement that "inhalation contributes insignificantly to health effects estimated for the site except

for radon (emphasis added). In the FS where the no-action alternative is evaluated and the "Protection of the Public" is addressed in FS 6.1.3.2 (FS page 6-5), the carcinogenic and radiological "risks would be due primarily to external gamma radiation (and) inhalation of radon..." This conclusion is reached even though the FHHS population and person-years of potential exposure was not weighted as heavily as I think appropriate.

COMMENT: Radon is again emphasized as important in the health effects for the site, yet its actual modeling and evaluation are not clearly addressed here. See related comments below.

QUESTION BA-3: Why weren't the actual on-site radon air quality data (that have been gathered since at least 1987) used instead of modeling?

QUESTION BA-4: In the third paragraph on page 5-33 please explain the statement that "..the related uncertainty (in the exposure point calculations for the highly contaminated buildings) does not affect the outcome of this assessment because interim action decisions have already been made for these structures"? Explain, why interim decisions should affect assessment calculations if done properly with realistic assumptions?

In 5.6.2.3 where exposure pathways are discussed, no mention is made of inhalation exposure for radon despite comments in 5.2.3.1 mentioned above that radon decay products are 99% of the calculated risk. Then under Toxicity assessment that concept is reinforced with the comment (pg 5-37 second para.) that "radioactive contaminants are generally the primary contributors to health effects estimated for the site."

COMMENT: These statements about concern for risks due to radon and radioactive contaminants are in sharp contrast to the lack of detailed evaluation of impact on existing populations near the site, see question BA-2 for example.

In 5.6.4 the risk characterization is specifically mentioned as focusing on the "standardized individual" for worker protection, an adult male. The next sentence at the bottom of page 5-38 starts out "although children are more susceptible to radiation exposure."

QUESTION BA-5: With such a large population of children (albeit not "young") in the FHHS just to the east of the site, how can you justify omitting consideration of their dose? (See following discussion as well in developing your answer.)

In 5.7 (page 5-42) the significance of radon-222 is restated as "the total risk is dominated by inhalation of radon-222 decay products derived from radium contaminated soil." Then the potential health effects were estimated for "adjacent off-site areas."

COMMENT: Despite these strong statements, there is absolutely no discussion of the radon being emitted from the quarry surface and/or the release of radon as the quarry sludge is handled and brought to the site.

QUESTION BA-6: Since "adjacent off-site areas" were evaluated for impact, why did you not address the FHHS for these BA health effect estimates?

REMEDIAL INVESTIGATION:

In 2.2.3 there is the statement that an emergency preparedness plan (EPP) has been prepared.

COMMENT: There is no indication here that the EPP utilizes the real time meteorological data from the site meteorological tower much less the use of 15-minute average meteorological conditions, as called for by DOE guidance ["Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," DOE/EH-0173T (Jan. 1991)], rather than the hour average data discussed in the FS. One can only hope that despite the downplaying of the air transport route, the EPP makes a serious effort at proper planning and implementation.

In 3.6.2 there is the statement that "a site-specific meteorological study at the Weldon Spring site as part of the RI/FS has not been undertaken..." Yet in 4.2.2 while there is the statement that "no long term (meteorological) data are available," at the beginning of the paragraph, another statement at the end of the paragraph stated that "a meteorological station was established at the site in early 1990." If this is true, then the other claims that there are no long term or current meteoro-

logical data are not accurate.

Data from early 1990 through 1992 would approach, if not exceed, the data gathered during parts of 1983 and 1984 along with all of 1985. The guidance of DOE/EH-0173T urges use of at least one year of on-site data for modeling and predictive work. Obviously a Meteorological tower installed and sited for site conditions in the 1990s would be more applicable than a tower installed in the mid 1980s near the raffinate pits (section 3.6.1).

Properly QAed (quality assured) data from the current tower should be available for use by now. It is my experience from other Superfund cleanup sites that fully QAed data for a full year are available within a couple of weeks of the end of the year, if it has been professionally operated and checked during the year.

QUESTION RI-1: What is the purpose of the meteorological tower that has been operating on-site since the spring of 1990 and to what use have its data been put?

QUESTION RI-2: Why is the comment made in 4.2.1 that meteorological "data collected from locations closer to the site, such as Spirit of St. Louis Airport, Labadie Power Plant and the Busch Wildlife Area will be included in the site documents when they become available" when there is on-site data? Aren't two of those data bases (Spirit and Busch) already in the public domain and readily available?

In 4.2.1.5 there is a discussion of tornadoes in the vicinity. Mention is made that in the "most recent 40-year period of records for the St. Louis area, there have been only four tornadoes that produced extensive damage and loss of life." The reference is dated 1979, hence these figures must pertain to 1 period like 1935-1975.

QUESTION RI-3: Why hasn't anyone asked the local meteorologists in the St. Louis-St. Charles area about the reports of several tornadoes in the St. Charles area in recent years? Why have you ignored the 1991 damage in St. Charles County due to either "straight line wind," a "downburst" or, perhaps, a small tornado or the fact that localized damage at one site is just as significant as "extensive damage and loss of life"?

The comments in 4.2.1.6 on air quality deal exclusively with regulatory issues and criteria pollutants, NOT primary concerns for this site.

QUESTION RI-4: Why does your discussion of air quality ignore a discussion of the on-site radon measurements (radon being the most significant air quality factor on the site if the above comments from the BA can be believed) and their location, pattern and implications?

The majority of the comments in 4.2.2 regarding Site-Specific Climate are quite irrelevant since they ignore the on-site data discussed above. The statement in 4.2.2.5 that the "only on-site climatological monitoring is limited to precipitation" is untrue in light of almost three years of on-site meteorological measurements (see above) including precipitation!

QUESTION RI-5: What reason does DOE's PMC have for continually downplaying and ignoring the on-site meteorological data as is so evident by statements such as the quote from 4.2.2.5?

COMMENT: Frankly the credibility of these documents is weakened by such glaring omissions that expose the limited awareness of on-site professionals for available data that could assist their efforts. It surely seems the staff was operating in a vacuum that recognizes little site meteorological or air quality data past the mid-1980s!

In 5.6 there is discussion of the air monitoring (as distinguished from air quality above that appears to deal with criteria pollutants only and not site-specific pollutants of concern). Despite all the other descriptive sections on the atmosphere that try to describe multi-year average trends, only one year of air monitoring data is summarized.

QUESTION RI-5a: With data extending from 1987 through 1992, why is only one year, 1989, presented?

QUESTION RI-5b: The implication is that in late 1992 there is not yet a compilation of valid, QAed data more recent than 1989, "the most current year." What has delayed the validation of at least 1990 and 1991 data??

QUESTION RI-5c: Why are we not given the full data set for evaluation of trends, etc.?

COMMENT: It is interesting to note that the DOE guideline for radon-222 in the ambient air is at 3 pCi/L (above background of 0.1-0.2 pCi/L) while EPA's current Citizen Guide for Radon urges that homeowners consider remediating levels in the 2-4 pCi/L range. It is also interesting to note that in the outside air near the quarry in 1989 (RD-1003 in the first quarter) and 1988 (RD-1001 in the third quarter) exceeded the 4.0 pCi/L levels with readings of 4.7 and 5.6 pCi/L respectively. Yet little to no mention is made of the quarry and its radon in figuring risks, etc. in the BA, RI or the FS.

COMMENT: It should be made clear to the public that the discussion of the asbestos monitoring by PCM (phase contrast microscopy) in 5.6 is more than a little exaggerated. The PCM does not have the capability to analyse air samples to see "fibers having a size and shape which are characteristic of asbestos!" PCM can only do that for bulk samples as is clearly stated in the next sentence - "The method does not distinguish asbestos fibers from other airborne fibers..." TEM (transmission electron microscopy) IS an unambiguous means of identifying asbestos fibers in the air. YET only 12 such samples were collected during 1988 and 1989. Thank goodness they were collected at the FHHS so that the largest nearby receptor population received some monitoring attention.

Section 6 addresses fate and transport of contaminants. 6.1.1 deals with air. It is only one paragraph long!! **DESPITE THE MANY REFERENCES IN OTHER PARTS OF THE BA, RI and FS NOTED IN THIS RESPONSE TO THE SERIOUS IMPACT OF RADON GAS (even to the extent that it is responsible for 99% of the risks in one analysis), RADON IS NEVER MENTIONED!!**

"Release mechanisms" for air contaminants that are mentioned include "generation of fugitive dust, disturbance of friable asbestos and, to a lesser extent, volatilization of contaminants."

Then the summary statement is made that "air transport is currently (emphasis added) not a significant exposure pathway."

QUESTION RI-6a: What is the release mechanism that accounts for the high radon levels near the quarry where there was no human activity?

QUESTION RI-6b: How will the release mechanisms change during site activities where water and sludge will be

disturbed at the quarry? And, if option 7a is selected, will vitrification make even non-volatile compounds volatile?

COMMENT: I realize that the RI is limited but those limitations need to be more clearly reinforced so that a statement that may pertain accurately to the quiescent site ("air transport is ... not a significant exposure pathway") is not readily picked up as characteristic of the active site!!

COMMENT: There is a considerable gap in thought processes evident in the one paragraph dismissal of the air route. The air transport route is THE most rapid means of potential exposure for any nearby residents. Air contaminants move quickly from source to receptor in a matter of minutes - not days, months or years as with many of the soil, water and biological transport routes. It is a gross public disservice to dismiss the air route so glibly! The air route is recognized by DOE guidance documents (DOE/EH-0173T) as one of the main reasons for an emergency preparedness plan, so much so that the guidance urges 15-minute average, real time wind information to guide management response decisions. NO OTHER MEDIUM WARRANTS THAT LEVEL OF TIMELY ATTENTION! Yet here it is dismissed in one small paragraph.

FEASIBILITY STUDY:

While the FS purports to deal in more detail with site cleanup activities and their impact, it still has a strong tendency to dismiss the impact of radon and the general exposure by the air pathway. The following comments and questions will focus attention on some of the more glaring topics and discussion.

Table 1.4 (pg 1-41) is an excellent example of ignoring the air route and the general public. It supposedly addresses off-site "exposure scenarios" under Human Health Assessment (Section 1.6.1) as part of a summary of Site Risks. Yet somehow the air pathway disappears even though the "maintenance worker" and "resident" and others from the on-site scenarios only a couple hundred meters away all have inhalation exposure from the air route.

QUESTION FS-1a: Why has your analysis eliminated the air pathway from the off site exposure consideration?

QUESTION FS-1b: Please justify the attention to exposures of recreational visitors and sportsmen when their exposure is 80 and 28 person-hours per year when the FHHS off-site population has a potential of 2,160,000 person hours per year of exposure? (See earlier question BA-2 for context and assumptions leading to this estimate.) It should be noted that the FHHS population is closer to the site than two of the lakes (34 and 35) consistently cited for exposure calculations!

I wonder about the completeness of your calculations when Table 2.1 that addresses areas and volumes of contaminated media is so inconsistent in dealing with the quarry. For example, it appears that there will be no sludge or sediment from the quarry. It also appeared that there will be no structural material from the quarry despite the knowledge that building debris and equipment are part of the subsurface collection of items under the water. Yet the only quarry quantity mentioned in this table is vegetation while page 2-1 lists "sediment and sludge ... from the quarry area" as "source areas and contaminated media of concern." Later on page 2-3 air is listed as a medium but only as related to "soil contamination," not water and sludge disturbance. There seems to be inconsistent addressing of potential sources terms for future calculations of impact and risk!

COMMENT: While page 2-1 clearly states that there are quarry materials "of concern," under 5.2.1.9 (page 5-7) where option 6a is being discussed, the impact of these materials is dismissed by the statement "... the specific decision for what residual material might be removed and to what level is outside the scope of this FS.." I'm confused.

QUESTION FS-2a: With the omission of handling significant material and debris at the quarry, there could well be an underestimate of the release of radon from such handling. How would a realistic consideration of the handling of a more complete range of quarry material affect the computation of radon and other radioactive releases both at the quarry and at the TSA? AND what are the subsequent computed human health risk impacts - keeping in mind the FHHS population exposure?

QUESTION FS-2b: How are we supposed to be able to evaluate the impact of various options if they are stated as materials of concern one place (with the clear implication that their impact will be computed in some later section of the FS) but then omitted from the scope of this work just when their impact is of most interest? (It is not sufficient to state that such computations are uncertain - sure they are but at least a range of possibilities and impacts can be evaluated on a "what if" basis for public and "expert" review.

Table 2.2 purports to deal with the site cleanup criteria. Yet there is only obscure and circular reasoning given for the air medium.

COMMENT: Table 2.2 says that cleanup "criteria for air would be related to those for soil, raffinate pits, and buildings." It is not at all clear how air and soil are related since one is a solid and one a gas. The circular reasoning that "interim action" addressed certain aspects and sludge would be "addressed as indicated above," misses the point that <u>air contaminants, especially radon, will be released by site activities</u>. Hence stringent engineering controls are needed to deal with something generated during cleanup rather than something that is physically contaminated in place.

The radon "standards" are quickly presented in 2.2.1.3 (pg 2-10) with the glib statement that "the measured concentrations at the site perimeter currently meet these standards."

COMMENT: This statement seems to imply that all is well. But, again, the glibness belies the fact that radon will be generated during cleanup activities as waters, sludges, and soils are disturbed, transported and handled.

QUESTION FS-3: Why have you ignored the radon source term from so many potential sources (see FS-2 as well)? AND when will revised and more complete projections and estimates be carried out including a more realistic array of sources and receptors?

Under 2.4 there is a discussion of Cleanup Criteria for Site Soil, which according to Table 2.2 is also supposed to be related to air criteria. In 2.4.1.3 there is (on page 2-24) a discussion of "incremental risk following site cleanup." Some of these risks are still well-above the usual EPA risk factors

of $1x10^{-6}$. Nevertheless I see no "incremental risk" for radiological exposures to radioactive species such as radon during the site cleanup.

COMMENT: At this point it seems relevant to mention that under the 6 Detailed Consideration of Alternatives, EPA criteria call for protecting the public from risks "in the short term" as well as the long term. Attention to that criterion is sometimes confused when it seems so many phrases dismiss risk without quantifying it!

QUESTION FS-4: In light of the ability to produce "incremental risk" calculations for post cleanup conditions, and in light of comments like that on page 4-31 (..."increased air emissions might pose a concern relative to air quality ..." from the vitrification operations) why are there no clearly communicated results of these risk calculations for radon and organics?

The air quality associated with dust generated by on-site activities received plenty of attention in 5.2.1.10 (off-site borrow soil) and 5.2.1.11 (mitigation and monitoring). Here the conventional dust monitors are mentioned as well as "state-of-the-art radon monitors." (These are apparently described in a joint MKF-JEG "environmental Monitoring Plan" that was not available to me at the time of this review.)

COMMENT: Here is another example of the inconsistencies throughout these documents regarding the air route and radon. It is at one point referred to as a serious risk yet hardly mentioned as having potential sources from which health risks can be computed. YET it is of enough concern that "state-of-the-art radon monitors" are planned to document site conditions. It would be nice if a more consistent, serious treatment of radon, its risks and health assessment was evident in these documents!

LO AND BEHOLD more inconsistency - on page 5-11 after dismissing some of the quarry materials (see above) as being out of the scope of this FS, there is a brief discussion of the "... potential contaminant releases (especially radon) from the site." [So I guess radon is there after all.] There is also mention of "dust suppressants" to be used on the "quarry material susceptible to airborne emissions."

QUESTION FS-5: What calculations of gaseous releases from quarry materials were carried out in the risk assessments

related to these operations? How effective were the suppressants assumed to be for their designed function of dealing with particles? What assumptions were made with regard to their parallel impact on suppressing radon release? What were the experimental/field trial data used to support these assumptions and calculations?

In the discussion of Treatment (5.3.2) under the vitrification option (7a) the very simple statement is made, "Emissions from the vitrification process would be treated before being released to the atmosphere." The final output would also be passed through a HEPA filter. That is indeed impressive considering the flow restriction imposed on exhaust gases by such a filter and the impact of potentially high water vapor content from prior gas and vapor treatment/scrubber steps. Despite these reassuring words Table 5.5 (page 5-35) indicates that appreciable emissions will occur, including almost 1 Curie of radon a day!

QUESTION FS-6: Considering the fact that the vitrification facility is indicated on maps as bing near the FHHS side of the site, what radon risk calculations were developed for that population of 2,160,000 person hours per year? If the full population of FHHS was not used in the risk computations in the appendices, why not?

QUESTION FS-7: I did not notice any mention of continuous stack testing capabilities to assist in the management and control of the emissions from the vitrification facility. What emissions measurements are planned for the facility? How will they be tied into the emergency preparedness plan? and What real time modeling will guide the real time assessment of impact to be tied in with the perimeter monitoring to assure public safety?

[Some of the health effects issues become confused in the FS due to the many referrals to Appendices C, E and F. There will be comments and questions raised below with regard to technical aspects of those appendices.]

We again encounter conflicting statements as section 6 tries to evaluate the "No Action Alternative." In 6.1.3.2 (as noted earlier in the BA section), under Protection of the Public, with no action the "on-site receptors" (those 80 person-hours per year populations as opposed to the nearby 2,160,000 person-hours per year at FHHS) would have risks greater than 1 in a million ($1x10^{-6}$). "these (on-going) risks (with no action taken) would be due primarily to external gamma radiation (and) inhalation of

radon ..." THEN on the very next page (6-6) under Air Quality, there is the statement that "the site does not impact air quality (Section 3.2.2.1 of the BA) and the air pathway does not contribute to off-site health impacts."

COMMENT: The glaring inconsistency between these two statements that discuss the impact on populations separated only by hundreds of meters is hidden in Appendix E and the BA. I contend (as related to my FHHS population exposure issues raised before) that **THERE APPEARS TO BE NO AIR QUALITY IMPACT OFF SITE BECAUSE SUCH IMPACT WAS NEVER REALISTICALLY EVALUATED.** When 80 person-hours per year populations are evaluated and 2,160,000 person-hours per year populations are ignored, there is much less off-site impact, probably none!

BUT while the models say no impact under current data input and assumptions, other input and assumptions that are closer to real world conditions just might indicate an impact.

FS APPENDIX C. AIR QUALITY MODELING AND ANALYSIS

While the first paragraph of this Appendix recognizes that "the air pathway is considered the principal route by which the general public could be exposed to site contaminants during ... remediation action activities ...," the next paragraph mentions that the results of this modeling effort are "used in the health assessment of Appendix F which addresses the potential human exposures to particulates." Radon is not mentioned as being of concern for this modeling effort despite clear statements of concern in other parts of these documents as noted above.

The comment is made under methodology (page C-5) that "uncontrolled emission rates were calculated from emission factors" found in the EPA's chief guidance document for releases, AP-42. Yet EPA in AP-42 does not address radon emission rates from various activities, so I guess the modeling effort of Appendix C using a well-known EPA model, ISC-ST (Industrial Source Complex - Short Term), that is optimum for gaseous dispersion predictions, was indeed used for particulate modeling and not radon.

Because "the ISC model is limited in its effectiveness for considering the effects of uneven terrain" (page C-6) they had to justify its use here by stating that they were modeling only

"nonbouyant fugitive dust" hence the only impact area is quite local and the limitation "does not impact the analysis."

COMMENT: Perhaps preselecting a limited model explains why no far-ranging impacts are modeled, especially when one considers the omission of radon from the species modeled here. [I should take care to mention that radon was indeed modeled, apparently by using CAP88 (based on a 1979 EPA dispersion model known as AIRDOS-EPA (EPA 520/1-79-009). That model is much less widely used than the more refined models like ISC for gaseous dispersion and is apparently more of a "straight line model" than one that can incorporate a wide variety of meteorological and terrain considerations. Hence it is unclear that it would be the best model for the existing site terrain that should include the area from the quarry as well as the chemical plant.]

QUESTION AC-1: There is an extensive discussion of ISC assumptions for ISC-ST modeling input for the local fugitive dust modeling (C1.1 and 1.2) but no similar discussion for the radon modeling that could have far more impact off site. What were the assumptions used in developing and implementing the CAP88 modeling effort, particularly the consideration of terrain, joint frequency distributions of winds and stability, source strengths for various radon-release activities, etc. in running the radon dispersion models?

QUESTION AC-2a: The ISC-ST modeling effort used the on-site meteorological data from 1985. It is a shame that the current 2.5+ years of current on-site meteorological data were not used. What is the reason that these current data were not used, considering they meet the DOE guidelines of duration and site representativeness?

QUESTION AC-2b: Was the siting/exposure of the original 1985 tower evaluated to see if it met EPA siting guidelines (EPA 450/2-78-027R and EPA 450/4-87-013)? This question is of concern since the diurnal wind patterns shown in Table C.10 (page C-39) indicate an unusual uniformity for direction that could well be linked to shielding or channeling near the raffinate pit site where the 1985 tower was located.)

QUESTION AC-3: The average annual concentration for the remediation period, 1993-1999, was computed as described on

pages C-12 and C-13 that combines all years. Why weren't the health impacts of individual years computed as a conservative scenarios rather than the smoothed and lowered 7-year average??

COMMENT: It should be noted that the modeling does predict three 24-hour average exceedances for the EPA's PM-10 particulate standard (Table C.2 on Page C-14). Yet no comment is made that these modeling predictions indicate that more stringent sources controls would be called for or implemented!

COMMENT: On Page C-15 there is a statement that addresses control measures that could be applied including "... considering meteorological conditions such as wind speed and direction when scheduling certain activities." (There is a similar statement in the first paragraph of page C-25.) While this strategy sounds practical it should be noted that EPA evaluated such meteorology-based control strategies in the 1970s when they were called "Supplemental Control" and ruled them out since engineering controls were supposed to be primary!

COMMENT: On pages C-16 and C-17 is an example of simplistic engineering reasoning that indicates why limited impacts are found from these modeling efforts. In discussing the emissions from the vitrification stack the comment is made, but unsupported by the "controlled emission" data in Table 5.5 of the FS (FS page 5-35), that "no significant air quality impacts are expected from these emissions because the facility will be equipped with an extensive off-gas treatment system..." The modeling effort is supposed to examine various alternative operating scenarios and impacts, NOT DISMISS AN IMPACT DUE TO OPTIMISTIC DESIGN ASSUMPTIONS. This treatment of off-gas emissions is an example of the mis-handling of available data that minimizes the potential impacts of these operations. Hence I cannot be certain that proper conservative practices were actually followed in this modeling and evaluation effort.

QUESTION AC-4: What are the subtle assumption differences between the "janitor" receptor at FHHS and the "student" receptor that leads to a 10-20% difference (Table C-5 for example) in modeled predictions? And for radon, especially, what are the health implications of the radon exposure for the exposed population at FHHS, not just one individual??

Page C-22 continues the simplistic engineering assumptions by stating the vitrification "stack emission would be very low compared to fugitive dust releases." While gross quantities will indeed be lower, they will probably be from a source located nearer to offsite receptors and hence deserve some modeling to evaluate impact.

Page C-24 contains further simplistic engineering reasoning (second paragraph in C.1.3.2) when discussing fugitive emissions from stockpiles and the need to model them. "Wind speeds measured at the site indicate that winds are probably not strong enough to cause erosion." ... the fugitive dust releases on potential off-site receptors is expected to be minor because wind speeds high enough to generate wind erosion would also mix the airborne particulates in a large air mass and thus would dilute the emissions, thereby offsetting the potential for impact from other possible on-site sources of fugitive dust."

> COMMENT: If the above statement were true, there would be no fugitive dust problem anywhere! It is the quantity of fugitive dust that must also be considered. AND REMEMBER the old 1970s axiom "dilution is not the solution to pollution."

Somehow an evaluation of the Salem, Illinois mixing height information has led to the statement on page C-37 in Section C.2.5 that "the lowest seasonal mixing heights are 1500 ft. for a fall morning and 2600 ft. for a winter afternoon." These are important considerations for predicting concentrations and seems far too high.

> QUESTION AC-5a: Please describe exactly how these mixing heights were determined.
>
> QUESTION AC-5b: Were the extensive rural and urban mixing heights from the multi-year EPA Regional Air Pollution Study (RAPS) from the mid-1970s obtained to see what was actually measured seasonally compared to Salem predictions? If not, why not do it now and refine the models to reflect local experience?

APPENDIX F: POTENTIAL HEALTH EFFECT OF REMEDIAL ACTION

By this point it might be simplest to state that I feel that the only credible health assessment would be those made after incorporating the many suggestions made above. However, I will

try to briefly address selected areas in this Appendix so that they are not forgotten.

The Health Risk evaluation in F6 is still based on the assumptions of little to no releases due to the claim that the "emissions would be treated before release" (see FS.5.3.2 above).

On page F-19, there is the mild statement that the "annual risk risk of about $2x10^{-4}$/year for cancer induction or about $1x10^{-3}$ over the 7-year cleanup period." Considering that most communities and concerns for regulating air toxics aim at $1x10^{-6}$ risk, these levels are quite high AND they were obtained with, what I consider to be flawed assumptions and flawed meteorological data.

I appreciate the opportunity to provide comments and hope they will lead to a positive reevaluation of the way air quality issues were handled throughout these assessments.

Very truly yours,

William M. Vaughan, PhD

cc: George Farner (SCCAHW)

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