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ATSDR received comments on the Stauffer Chemical Company Public Health Assessment, Public Comment Release (April 2, 2003), from a total of six private individuals, companies, organizations, and agencies during the public comment period which ended on June 3, 2003. These comments and ATSDR's responses are presented below.

The comments are generally included verbatim; however, names of individual commentors and associated personal identifiers have been deleted. Some comments contain page numbers that refer to the public health assessment document that was released for public comment, not this final release document.

COMMENTOR 1

Comment #1: Stauffer Management Company LLC ("SMC") welcomes the opportunity to comment on the April 2, 2003 Public Health Assessment ("PHA") prepared by the Agency for Toxic Substances and Disease Registry ("ATSDR") regarding the former Stauffer Chemical Company ("SCC" or "Stauffer") site in Tarpon Springs, Florida (the "Site"). The Site has received considerable public attention, both during its operation and especially recently in connection with proposed remediation plans that were approved by the United States Environmental Protection Agency ("EPA") in 1998. The PHA received media attention when it was released and is likely to attract additional public interest in the future. It is therefore very important that any and all health risk communications contained in the PHA are clear, understandable, accurate, and substantially supported by facts and science.

Although the PHA includes a number of positive conclusions that are clear, well supported and consistent with what SMC -- and many state and federal agencies -- have been saying for many years, the PHA fails, in a number of respects, to deliver relevant, understandable and supportable public health messages. This failure is particularly evident in the PHA's discussion of historic air quality in the region and former workers.

SMC has therefore prepared extensive comments on the PHA. Because of the length of the PHA itself and the extent of SMC comments, it was not possible to respond to or comment on every item in the PHA with which we disagree. SMC's silence on any particular point thus should not be construed as assent. For similar reasons, we have not redlined our comments against the PHA. Rather, we have organized our comments in such a way that ATSDR should not have difficulty in making necessary revisions.

In order to facilitate ATSDR's and the public's understanding of SMC's comments on the PHA, we summarize our comments here. Detailed comments are provided in the sections that follow and in Appendix A, which contains a number of more specific comments.

Although the PHA includes a number of important public health messages that are factually and scientifically well supported and should reassure concerned members of the public. For example, the PHA:

- **concludes that the Site is currently not a public health threat;**
- **confirms that soils at Gulfside Elementary School do not pose a health hazard to students or staff and that the students who attended the school from 1978-1981 would not likely be at any risk today from historic air emissions;**
- **concludes, albeit somewhat indirectly and without sufficient clarity, that alleged air emissions of sulfur dioxide ("SO2") and particulate matter ("PM") from the Site prior to 1982 are unlikely to present health risks to the public today; and**
- **reconfirms that private and public drinking water supplies are not affected by conditions at the Site.**

Ultimately, the PHA does not raise any new health concerns. Moreover, ATSDR has not given credence to some of the more alarmist and unfounded allegations and theories that were raised in ATSDR Ombudsman Ronnie Wilson's December 2000 Report and Recommendation, either by contradicting them directly or by simply refusing to give them any additional attention. This is a positive outcome that should facilitate the process of moving the Site toward actual remediation after too many years of delay. ATSDR has more than fulfilled its statutory obligations and authority.

ATSDR Response: Comment noted.

Comment #2: In other respects, however, the PHA fails to achieve the goal of conveying a clear and understandable message. For example, the largely positive messages summarized above are sometimes buried in lengthy, largely academic, discussions rather than highlighted in a concise summary, resulting in unnecessary ambiguity and misunderstandings, as reflected in the media reports that accompanied the release of the PHA. The ambiguity is also partly due to the fact that the PHA contains many statements that are repeated in various locations without consistent application of the qualifiers and limitations that are necessary to place the statements in proper context. The result is that specific statements can too easily be taken out of context and used in a misleading and unintended way.

Moreover, in other instances, ATSDR conveys a mixed message where an unambiguously positive one is appropriate. For example, it is apparent that ATSDR concluded no health risks were presented by exposures to off-site slag, sediments, biota, or river water, as the

PHA contains no recommendations with respect to them and they are not discussed in Section 5 ("Public Health Implications"). Yet, no such conclusion is stated in the PHA. The absence of such a clearly stated conclusion is problematic in light of the PHA's conclusion that off-site slag, sediments, biota, and river water present completed or potential exposure pathways.

If, as we believe, the intent of ATSDR was to communicate that persons working or living beyond the Site's boundaries are not at risk today, then we submit ATSDR must do a better job of stating that position, which should be reflected in a revised PHA. Part of the problem in this respect lies in the fact that the PHA devotes so much attention to theoretical past health risks from estimated past exposures, which is contrary to the primary purpose of a public health assessment such as this. As noted in the PHA's "Foreword", the aim of public health assessments at NPL sites "is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced". The primary focus (indeed, according to ATSDR's Public Health Assessment Guidance Manual, "the critical question") should be the potential for current and future exposures from current conditions and how to mitigate those potential exposures (for example, by implementing an appropriate remedy). In this case, after concluding quickly – and responsibly – that the Site does not pose a current health risk, ATSDR spends an inordinate amount of time and effort speculating about past health risks to the community from estimated (rather than documented) exposures, based on arcane and inconclusive studies reported in the scientific literature. We submit that this lengthy, and ultimately unproductive, exercise has contributed substantially to the PHA's lack of clarity. We see little rationale for its inclusion in a public health assessment of this nature.

ATSDR Response: When ATSDR conducts a public health evaluation of a hazardous waste site, ATSDR evaluates the public health significance of past, present, and future exposures. ATSDR clearly states in the public health assessment and in fact sheets distributed at public meetings that the site is currently not a public health threat. ATSDR also met with reporters during its public meetings so that they were aware of the agency's findings for past, present, and future exposures.

ATSDR's evaluation of past exposures is described in detail in the body of the public health assessment (1) because ATSDR concluded that past exposures to sulfur dioxide and particulate were likely to be a public health threat, and (2) because of the controversy surrounding this site. Such controversy requires a detailed review of the scientific literature be conducted and presented to support ATSDR's conclusions. Presenting the findings of the public health assessment took several forms:

1. a detailed review of the environmental and scientific basis of the findings, (i.e., the body of the public health assessment),
2. a summary of those findings and the scientific basis for the findings (i.e., the Executive Summary), and
3. fact sheets on specific public health issues for the site written specifically for the public.

Therefore, ATSDR presented its findings for the Stauffer site at various levels of detail and readability so that the public and the scientist could read and review its findings.

<u>Comment #3:</u> The PHA contains a number of substantive flaws as well, which we summarize here and discuss at more length in the sections that follow.

Regarding the discussion of alleged past health risks from estimated past exposures to SO2 and PM, ATSDR's attempt to estimate historic SO2 and PM levels by way of a model is likely to have overstated the actual levels. The result is a series of speculative, and we submit inappropriate, statements regarding theoretical past health risks. The PHA does not give sufficient weight to the fact that the area around the Site in the late 1970s and 1980s was substantially in compliance with then-applicable national ambient air quality standards, which are intended to protect the public against adverse health effects with an adequate margin of safety. The area was in substantial compliance even though known sources of SO2 and (especially in ATSDR's view) PM, other than the Stauffer facility, were in operation at the time. Nor does the PHA give appropriate weight to the fact that the stated health concerns in the Tarpon Springs community (asthma, lung disease, etc.) are common ailments and that there is no evidence that they are elevated above expected levels. In addition, the PHA fails to highlight consistently, fully and understandably the significant limitations of the scientific literature upon which ATSDR relies, while other relevant literature is not discussed at all. ATSDR also fails to adequately place the theoretical discussion of the scientific literature and the estimated exposure levels into the context of any current risk to people today. And while it discusses the risks of transient, past health effects, the PHA does not provide a meaningful discussion regarding how many people may actually have worked or resided prior to 1982 in the very narrow vicinity of the Site described by the ATSDR.

<u>ATSDR Response:</u> ATSDR's assessment of the possibility of harmful effects occurring in some residents is supported by the following facts and points:

1. Environmental monitoring data for sulfur dioxide and particulate matter are available from the Anclote Road monitoring station for several years towards the end of Stauffer's operations.

2. This station was located very close to a marina indicating that residents who worked at or visited the marina were exposed to elevated levels of sulfur dioxide and particulate matter.

3. It is reasonable to assume that contaminant levels found at the Anclote Road monitoring station reflect levels that are found at the same distance in other directions on days when wind blew in those other directions.

4. Many residents commented on the irritating effects of air plumes coming from the Stauffer facility while it was operating. These complaints are supported by a toxicity evaluation of the sulfur dioxide.

5. When preparing the PHA, ATSDR took great care to ensure that the modeling analysis was scientifically sound and incorporated the best available information. As an added quality assurance step for this PHA (and our modeling analysis), ATSDR had a preliminary draft of the PHA peer reviewed by scientists outside our agency before the document was released for public

comment. The peer reviewers had consistently favorable feedback on the evaluation, including the modeling analysis. Consultants to Stauffer, for instance, commented: "In general, the air modeling was properly performed using the EPA-recommended default parameters for the ISCST3 air modeling runs." Our responses to other comments (e.g., see responses to Comments 7, 9, and 10) address more specific questions that this commentor raised about the modeling analysis.

6. One of ATSDR's peer reviewers commented that ATSDR was likely underestimating the effects that Stauffer emissions might have had on the community.

7. The air model that ATSDR used is widely accepted in the scientific community.

8. ATSDR clearly states that some uncertainty exists in its conclusions about possible health effects in residents who live farther away from Stauffer because the conclusions are based on an air model.

9. ATSDR thoroughly reviewed and presented the scientific literature on sulfur dioxide and particulate matter to support its conclusions. It should be emphasized that ATSDR's conclusion about the possibility of harmful effects is based on a review of the current scientific literature.

10. None of the annual geometric mean concentrations or 24-hour average concentrations were higher than EPA's former health-based air quality standards for TSP (75 µg/m3 and 260 µg/m3, respectively). However, many states implemented more stringent air quality standards for TSP. Florida's air quality standards for TSP, for example, were 60 µg/m3 for annual geometric mean concentrations and 150 µg/m3 for 24-hour average concentrations. As Table C-6 indicates, the annual geometric mean concentrations at the Anclote Road monitoring station were higher than the state of Florida's standard from 1977 to 1981. Further, 24-hour average concentrations at the Anclote Road monitoring station exceeded the state of Florida's air quality standard on 8 days between 1977 and 1981.

11. For some PM sources that consist of primarily larger particles (e.g., dust storms), the previous TSP standard was probably protective of public health. However, since this standard was in place, much has been learned about how particle size is related to adverse lung and heart effects; that is, the smaller or finer particles are more likely to be associated with these adverse health effects. Because of this knowledge, the EPA has moved towards making the PM standard a measure of the smaller-sized particles (by first implementing a PM10 and then a PM2.5 standard). Therefore, since ATSDR believes that it is likely that Stauffer and other sources in the area contributed appreciable amounts of fine particles to overall PM loading and exposures, then it is possible that the previous EPA TSP standard in the area of Stauffer Chemical was not as protective of public health as the Florida standard.

12. ATSDR discusses the EPA's National Ambient Air Quality Standards on page 59 of the public release version of the health assessment. ATSDR will review the public health assessment to ensure that proper reference is given to national ambient air quality standards. As discussed in the public health assessment, it should be pointed out that the Tarpon Springs area was the only non-attainment area in the state of Florida for sulfur dioxide.

Comment #4: The ATSDR's entire discussion of the former workers suffers from numerous flaws that fundamentally undermine the PHA's conclusions and recommendations. ATSDR ignores altogether available and highly relevant information, including a 111-page opinion by a Florida state court regarding claims for medical monitoring for the former workers, the extensive factual and expert record developed in that case, and an extensive epidemiological study of Florida phosphate workers – including former Stauffer workers – conducted in the 1980s and extended into the 1990s by a world renowned epidemiologist. Even more troubling is that many of the flaws in the worker analysis were pointed out in the peer review process. Although ATSDR responded to some comments, most comments regarding the former workers were ignored, even though many other comments by the peer reviewers on other topics were adopted. With all due respect, SMC submits that ATSDR's decision to ignore this relevant information regarding the former workers runs directly contrary both to ATSDR's assertion in the "Note of Explanation" that the PHA represents "the agency's best efforts, based on currently available information, to fulfill the statutory criteria set out in CERCLA" and to its statement that the PHA "presents a comprehensive review of available sampling data and other site information" (PHA at page 16). Most egregiously, ATSDR's statement that it had no information regarding worker employment tenure (PHA at page 125), which ATSDR admits is central to the issue of determining a worker's theoretical exposure (and dose) to the substances discussed in the PHA, is simply untrue. This information was presented and/or available to ATSDR.

All of this renders the PHA's discussion of the former workers misleading and largely irrelevant, and SMC strongly disagrees with ATSDR's recommendation that a workshop be held to discuss follow-up health activities or screening for former workers. There is no factual, medical, legal or policy basis to conduct such a workshop, especially in view of ATSDR's concomitant conclusion that it is not feasible to conduct a health study of the former workers. Indeed, ATSDR's own guidelines dictate against health screening in circumstances such as this; a workshop toward that end thus can serve no useful purpose.

ATSDR Response: ATSDR's assessment of possible health risks posed to former workers was based on the available data and information provided to ATSDR prior to April 2003 for the new PHA's public comment version. Since that time, ATSDR has received additional information about former employees' length of employment. This new information will be considered for the final PHA. While true that a majority of former workers had a very short length of employment, it is also correct to state that some former workers were employed for many years. Other relevant information is presented below.

1. Studies of the Florida phosphate industry were compiled and reviewed in 2003, and provided to the ATSDR-hosted Expert Panel meeting held on July 31, 2003. These studies were a mix of various phosphate industry processes; some were relevant to the process used at the Stauffer Chemical plant. An unknown number of Stauffer workers were included in the studies completed by investigators—Checkoway, Heyers, and Demers. The Checkoway et al. follow-up study was referenced in the PHA. Additional studies suggest that the Florida phosphate industry worker is at risk for elevated morbidity outcomes, including malignant and nonmalignant respiratory

endpoints; the relevant study manuscripts were provided in the Briefing Materials for the Expert Panel meeting.

2. Please understand that ATSDR bases public health decisions preferably on quantitative exposure measurements and environmental sampling results.

3. In mid 2003, ATSDR received information for Stauffer length of employment; the names of workers were not identified. This information was received after completion of the PHA public comment version. The worker tenure information will be considered for toxicological evaluation purposes. The employment information is consistent with SMC LLC statements indicating a very small percentage of workers were employed for more than 20 years, and a majority of workers were employed less than 1 year.

4. Because of scientific uncertainties (known and suspected exposures) for the assessment of possible health risks posed to former Stauffer workers and for taking action on a PHA recommendation, ATSDR convened an Expert Panel meeting on July 31, 2003. The purpose of this meeting was to seek advice from experts regarding the possible need or types of health follow-up activities appropriate for this worker cohort. The meeting was attended by various stakeholders, including a representative of the SMC. A transcript, along with audio tapes of the meeting, was made available to stakeholders in October 2003.

5. The input of external peer reviewers was considered and incorporated in the PHA report, as appropriate.

6. SMC asserts that the PHA concludes (Section 9.2.4) it is not feasible to conduct a health study of the former workers. This statement does not exist in the PHA's conclusions section.

Comment #5: The PHA also contains several statements and messages that are inappropriate and unfair to SMC. Particularly inappropriate is the PHA's discussion of health issues that ATSDR itself agrees are not related to the Site at all, such as non-Stauffer sources of PM and SO2, groundwater wells that are not affected by the Site, mesothelioma for persons having no connection to the Site, and off-site slag that could have originated from any number of sources. If ATSDR chooses to focus on such non-Stauffer issues, it should not do so in a document with "Stauffer" in its title, nor should ATSDR refer to the potentially affected community as the "Stauffer community". "Stauffer" has already been incorrectly blamed for any number of ailments over the years. ATSDR should avoid falling into the same trap in the PHA.

ATSDR Response: It is a common practice for ATSDR to address non-site-related public health issues in a public health assessment that arise during ATSDR's investigations. In many instances, these are health concerns conveyed to ATSDR by the public. As is the case with the Stauffer public health assessment, ATSDR states when these public health issues are not site-related.

ATSDR agrees that the phrase "Stauffer community" should not be used in the public health assessment. ATSDR reviewed the public health assessment and found one reference to the

"Stauffer community," (page 15 of the public release version). The phrase was replaced with a more appropriate reference.

ATSDR does not agree, however, that the messages in the public health assessment (PHA) are inappropriate or unfair. For example, ATSDR's evaluation of off-site drinking water exposures evolved from a consideration of both site contamination issues and community concerns.

ATSDR agrees that site groundwater contamination has not affected area supply wells, given the location of the source areas in relation to the off-site wells. The results of fairly extensive study of local geology and hydrology and groundwater sampling illustrate this point. ATSDR reviewed the findings of the multiple groundwater investigations conducted at the site. In examining the findings of these studies, ATSDR agrees that the predominant groundwater flow in the area of the SMC site is to the south/southwest, away from most of the deeper private wells and public water supplies. Recognizing this, the PHA includes appropriate language in various sections of the PHA (Section A [executive summary], Section 2.3.3.1.2, Section 3.2.2.1) to make this point clear and to explain why ATSDR still reviewed available data from off-site water supplies, in both upgradient and cross-gradient directions.

ATSDR reviewed off-site well data in response to community concerns about the quality of private drinking water supplies, and to ensure that we were thorough in our evaluation of any possible migration of contamination off site. ATSDR evaluated the public health implications of the few elevated detections in tested off-site wells, regardless of source. Examining exposure point data (in addition to site monitoring data) is a key element of ATSDR's public health assessment process. In doing so, ATSDR makes every effort to provide a balanced perspective regarding site contamination and how it may or may not affect public health.

ATSDR evaluated the quality of area groundwater by studying available hydrologic data, on-site groundwater monitoring data, and off-site private well data available prior to the public comment release PHA. As stated, this evaluation strongly suggested that site contaminants were not migrating toward drinking water supplies, but revealed that some uncertainties still existed at that time regarding the full lateral and vertical extent of contamination, mostly in terms of the connectivity between the surficial and the Floridan aquifer (Black and Veatch 2000; Flow 2001; Parsons 2002). ATSDR therefore closely examined metals and other site-related contaminants (e.g., arsenic, fluoride) to identify any notable trends. Because few perimeter or nested wells exist or have been extensively sampled, this analysis was somewhat limited. Appendix C of the PHA detailed ATSDR observations in this regard.

ATSDR also reviewed data released subsequent to the public comment release PHA (Parsons 2004 and O'Brien & Gere 2004). These studies confirmed earlier conclusions and helped to fill some information gaps. These studies showed that groundwater contamination (primarily arsenic, fluoride, phosphorus) beneath the sites was generally limited to areas at or near source areas (e.g., the ponds) and that no "plumes" existed showing any type of off-site migration. Geophysical studies conducted did show some connectivity between the shallow aquifer and the upper Floridan aquifer, particularly in the eastern portion of the site. Elevated concentrations of some metals and fluoride were detected in samples from these eastern perimeter wells in both the

shallow and Floridan aquifers, but flow in both aquifers is to the southwest and away from off-site areas (toward the river).

While the conclusions of the PHA remain unchanged regarding groundwater, we modified some text to make a clear distinction between groundwater contamination detected beneath the site and elevated concentrations of some substances detected in area private wells. We also included the findings of the Parsons (2004) Groundwater Studies Report and the O'Brien & Gere (2004) Geophysical Studies Report.

Comment #6: In addition, ATSDR frequently gives the appearance of blaming Stauffer for the lack of actual monitoring data while the plant was in operation, regardless of whether Stauffer was required at the time to collect and maintain such data or even whether anyone at the time viewed such data as important. With regard to PM, for example, Stauffer gathered TSP data that were required at the time. PM10 and PM2.5 data were not collected while the plant was operating because regulations did not even begin to focus on particles of that size until the late 1980s and 1990s. Similarly, Stauffer was not under any obligation to measure and maintain fugitive emissions data while the plant was operating. SMC also takes issue with ATSDR's general disparagement of some of the sampling studies conducted by Stauffer and others prior to 1982. Those studies were appropriate for the time, in some cases present the only analysis of then-available data, and cannot fairly be judged against present-day expectations. Likewise, ATSDR's comments regarding the lack of worker exposure data prior to the mid-1970s fails to mention that such monitoring data were not required or commonly collected at the time. Some acknowledgment by ATSDR regarding the evolution of monitoring requirements over the years would therefore be appropriate.

ATSDR Response: ATSDR strives to have its PHAs present fair, unbiased accounts of environmental health conditions, and we take seriously any suggestion that a PHA fails in this regard. The comment suggests that our PHA unfairly criticizes Stauffer's past environmental sampling efforts, but it does not specify which sections of the PHA raised such concerns. None of our internal reviewers or external peer reviewers (including a consultant to Stauffer) had previously raised similar concerns, and we regret the fact that a reader had these negative impressions of our document. To be sensitive to this feedback, ATSDR scientists carefully reviewed the entire PHA to determine whether revisions are necessary to address this comment. Our response follows for the two issues identified:

- "Appearance of blaming Stauffer" for not collecting monitoring data. ATSDR carefully reviewed the PHA for any appearance of blaming Stauffer for not collecting additional monitoring data. At the beginning of Section 3.3.2, ATSDR indicates that the lack of extensive emissions monitoring data resulted primarily from the fact that environmental regulations at the time did not require such monitoring; the section was never intended to imply that Stauffer should have collected additional emissions data. In cases where the section states that certain types of emissions data are not available, ATSDR has added text to clarify that Stauffer was not required to monitor the specific contaminant or emissions source. ATSDR made similar minor clarifications in Sections 3.3.3 and 3.3.4.

- "General disparagement" of Stauffer's sampling studies. In every PHA that ATSDR conducts, our health assessors review environmental sampling results for data quality, because environmental health conclusions should be based on measurements of a known and high quality. When preparing this PHA, ATSDR learned of several air sampling studies that Stauffer conducted, but the documentation we received for these studies was often incomplete and contained limited or no information on data quality. In the early stages of the PHA process, ATSDR asked Stauffer to provide insights on data quality or additional documentation for its sampling programs, but no such information was provided. As a result, our public comment release PHA correctly (in our opinion) states that Stauffer's sampling data are of unknown quality, which we note is different from stating that the data are of poor quality. We believe our account of the information that Stauffer provided is fair. None of the public comments that ATSDR received included documents, specific information, or other additional insights that would cause us to have a different opinion of Stauffer's sampling data.

Overall, ATSDR revised several sentences in Section 3.3 in response to this comment. It is our hope that these revisions will avoid any future appearance of ATSDR "blaming Stauffer" for not collecting certain types of environmental samples.

Comment #7: The PHA states that, "[a]ctual individual exposure to air pollutants is determined by a complex interplay among human activity, including the locations where time is spent, housing characteristics (as they influence penetration of outdoor pollutants) and other factors." (PHA at page 75.) The PHA ultimately discounts these limitations, however, when it concludes that "[l]evels of air pollution in the immediate area of the Stauffer facility while it was operating were likely to be a public health hazard because of the combined emissions from the Stauffer facility and from other sources in the area." (PHA at page 142.) The PHA makes no attempt to relate SO2 or PM emissions from the Stauffer plant to actual human exposures. There is no discussion of whether outdoor air modeling results are an acceptable scientific surrogate for actual exposure. The ATSDR's PHA and model fail to adequately acknowledge that the model results do not and cannot reflect actual historic exposures. For example, studies show that outdoor PM is less likely to enter air-conditioned homes (see Suh, H.H. and Spengler, J.D., 1994). Further, those most at risk of adverse health effects from outdoor air exposures are also the most likely to spend time indoors (i.e., the sick and elderly). Contrary to the PHA's assertion, the area residents did not have potential for "round-the-clock exposures" to SO2 and PM, because they invariably would have spent a significant amount of time in other locales, (i.e., at work and indoors). As a general matter, for PM in particular, the relationship between exposure at ambient levels and health effects related to those exposures remains unproven and is the focus of ongoing scientific research and debate. The PHA's failure to connect ambient air measurements to individual dose is a major limitation in its analysis, and ATSDR's modeling does not take into account this significant factor. Nor does it account for the very limited group of people who were theoretically at risk, i.e., in the case of SO2, asthmatics engaged in moderate to heavy exercise within 1540 feet of the kiln and in the path of an actual SO2 plume. With specific regard to PM, the PHA fails to discuss the fact

that ambient pollutants such as PM can be present at substantially reduced levels indoors, especially in tight, air-conditioned buildings. The PHA should acknowledge that the lack of consideration of exposure factors is a substantial uncertainty in the analysis, as actual exposures were likely lower than ambient levels.

ATSDR Response: The comment indicates that the PHA should distinguish the concepts of ambient air concentrations and actual exposure. Ambient air concentrations indicate the levels of contaminants found in the outdoor air at a given location. Section 3.3 of the PHA focuses entirely on summarizing measured and estimated levels of air contamination. Exposure refers to the amount of chemicals that enter people's bodies; inhalation exposure is a function of the air concentrations where people spend their time and inhalation rates. These terms are not equivalent. Over the course of a day, people are typically exposed to both indoor and outdoor levels of air contamination at many different locations, and the concentrations of contaminants tend to vary both with location and with time. Inhalation exposures are therefore a function of the amount of time people spend at a given location, their inhalation rate while at that location, and the air contamination levels found at that location. Sections 5.2 through 5.4 of the PHA focus on exposure.

ATSDR's main conclusions in those sections do account for the differences between ambient air concentrations and exposures, and we have included additional text in the PHA to emphasize this point. Specific considerations when responding to this comment follow:

- Sulfur dioxide exposures (Section 5.2). The nuances for sulfur dioxide exposures vary with the exposure duration. For acute exposures, it is conceivable that individuals near Stauffer spent 1 hour outdoors consistently breathing the air at a given location. Thus, the PHA need not account for some of the finer details of inhalation exposure assessment (e.g., microenvironments and activity patterns) that are clearly relevant when evaluating lifetime average exposures. ATSDR revised text in the PHA to clarify that the public health hazard for short-term exposure to sulfur dioxide occurred only for those people who were outdoors during times when ambient air concentrations of sulfur dioxide were elevated.

  For the chronic exposure scenario, ATSDR notes that the epidemiological studies used for our conclusions (Dockery et al. 1993; Pope et al. 1995, 2002) relate adverse health effects to ambient air concentrations, not to exposures. Therefore, it is appropriate in this case to base our conclusions on the measured and estimated ambient air concentrations of sulfur dioxide. The main assumption in doing so is that residents of Tarpon Springs have similar microenvironments and activity patterns as do the populations that the epidemiological studies evaluated. We believe this is a reasonable assumption to a first approximation.

  For acute exposures to sulfur dioxide, the public health assessment identifies people (and particularly people with asthma) who exercise outdoors as the most vulnerable group. The air model used to predict their exposures was used appropriately. It is unclear what the commentor means by the phrase, "Nor does [the PHA] account for the very limited group of people who were theoretically at risk....." The health

assessment clearly explains that actual air measurements from the Anclote Road monitoring station are the basis for determining that a public health hazard existed for residents who lived, worked, or played within 1,540 feet of the kiln and shows this distance on the map. The PHA explains that this public health hazard existed for all persons who worked, visited, or played within this distance from the kiln and that exercising asthmatics were at greatest risk because of their increased sensitivity to the pulmonary effects of sulfur dioxide.

- Particulate matter exposures (Section 5.3). One of the major issues brought up by the commentor relates to what is called exposure misclassification; that is, whether increases in ambient concentrations of PM from community monitoring stations, such as at Anclote Road, actually result in increases in personal exposures which may then lead to an increased risk of an adverse health effect. Moreover, whether personal exposures due to indoor sources (non site-related PM exposures) may have biased the findings of many of the epidemiological studies that ATSDR based its conclusion on regarding PM exposures. Exposure misclassification has been discussed extensively in the air pollution epidemiology literature. Statistical analyses of exposure error have indicated that the non-ambient component will not bias the statistically calculated risk in health studies using community monitoring stations, provided that the non-ambient component of personal exposure is independent of ambient concentrations. Therefore, it is reasonable to conclude that community-based health studies describe statistical associations between health effects and exposure to ambient-generated PM, but does not provide any information on possible health effects resulting from non-ambient PM (e.g., indoor-generated PM) (USEPA 2002). Moreover, a few studies have conducted simulation analyses of effects of measurement errors on the estimated PM effects. These studies suggest that ambient PM excess risk effects are more likely underestimated than overestimated (USEPA, 2002). In addition, the studies did not quantify every individual's inhalation exposure (e.g., by considering the amount of time they spend indoors and outdoors at different activity levels).

  ATSDR agrees that personal exposures to elevated levels of ambient and non-ambient sources of PM vary with many individual factors. However, as stated above, it is generally believed that there is an association between elevated levels of PM, as measured by community monitors such as the one at Anclote Road, and adverse cardiopulmonary health effects, and that it is likely that this association is underestimated rather than overestimated. ATSDR has obtained and reviewed the Riley, et al., 2002 and the Suh, et al., 1994 papers mentioned by the commentor here and in another comment. In addition, ATSDR also reviewed, prior to release of the PHA for public comment, the Janssen, et al. 2002 (a paper that one of our peer reviewers suggested that we consider). These studies are interesting and suggest that increasing air conditioning (AC) use may reduce PM10 and PM2.5 exposures and health effects (as measured by hospital admissions in the Janssen, et al., paper). However, as pointed out by Janssen, et al., their results must be further investigated because of the ecological nature of the study and because of the limited sample size. Moreover, as also pointed out by Janssen, et al., this study is the first study that

evaluated AC as an effect modifier of the relationship between PM10 and hospital admissions. Certainly, there is likely a higher prevalence of AC use in Florida as compared to other, cold-weather areas. However, certain site-specific exposure issues may ameliorate the conclusions of Janssen, et al., and the other authors as they apply to the evaluation of exposures to SCC emissions. For example, ATSDR calculated that during 1977–1981 the seasonal average TSP levels ranged from 63 ug/m3 to 90 ug/m3, with the highest average levels found in the winter and the lowest found in the summer. Because the prevalence of AC use in Florida is much less in the winter months than in the summer, we could conclude that persons in the vicinity of the SCC facility had a greater opportunity for exposure to the highest levels of PM during the winter months. Moreover, the study by Janssen, et al. did not include a coastal warm-weather city like Tarpon Springs; the most similar cities relative to AC use and climate were Nashville, TN and Birmingham, AL. It is likely the frequency of year-round outdoor activities is greater in a community like Tarpon Springs than in these cities, thus increasing the potential for exposures to ambient levels of PM.

In the final analysis, sufficient evidence does not exist to conclude that the results of the numerous epidemiological studies in the literature do not apply to the Tarpon Springs area, and the conditions related to the exposures to SCC PM emissions.

Overall, ATSDR believes that the comment raises an important point: exposure and ambient air concentrations are not equivalent terms. Nevertheless, we do not believe this issue affects our public health conclusions, for the reasons stated above. However, we have added text to Section 5 of the PHA to clarify the difference between exposure and air concentrations.

Comment #8: The PHA fails to acknowledge a number of uncertainties in the ATSDR modeling approach, several of which likely result in over-prediction of potential exposure levels. In particular, stack emissions data are used without any consideration of the production rate at the time of stack testing. ATSDR appears to have used measurements taken during periods of maximum production and extrapolated them to represent emissions 24 hours-per-day, 7 days-per-week, and 365 days-per-year. This technique is factually incorrect -- plant records show that the plant did not operate constantly, and when it was operating it was not always at maximum output. By ignoring these factors alone, ATSDR overestimates annual emissions by as much as 25%. ATSDR should state the conditions under which stack testing occurred and adjust the modeled emission rates in light of the production output records available for the plant to make them more reflective of long-term emission rates.

ATSDR Response: The comment addresses several aspects of ATSDR's dispersion modeling analysis. Regarding the general suggestion that the PHA does not acknowledge modeling uncertainties, ATSDR notes that Section 3.3 of the PHA includes extensive discussion of uncertainties inherent in air dispersion modeling applications and specific uncertainties that pertain to the analyses we performed on the Stauffer site.

The comment further discusses uncertainties associated with the emission rates for the site. The comment questions the emission rates used in our modeling analysis, yet provides no insight on

what the actual emission rates might have been from the facility. When conducting its modeling analysis, ATSDR derived emission rates entirely from documentation that Stauffer provided. The sulfur dioxide emission rate we used for the rotary kiln—the dominant sulfur dioxide emissions source—was 41.4 grams per second (g/s). We calculated this as an average of several stack tests that Stauffer conducted. Some of the stack tests had lower emission rates, and some were higher. Thus, the suggestion that we used the highest emission rate recorded is not correct.

ATSDR agrees that consideration of the operating conditions is important when estimating emission rates. However, that information was not included in the documents that Stauffer provided. Nonetheless, ATSDR carefully reviewed the existing information to ensure that the emission rates we used in the modeling analysis are reasonable and based on the best available information. As part of this review, we took comfort in the fact that the sulfur dioxide emission rate we used for the rotary kiln (41.4 g/s) was almost identical to the emission rate the Florida Department of Environmental Regulation used (41.2 g/s) in its State Implementation Plan for sulfur dioxide. Although we identified some permit records prepared by Stauffer that indicated the rotary kiln had an "actual discharge" of 52.1 g/s (an emission rate 25% greater than the rate we used in our modeling analysis), we chose to base our modeling entirely on the average of the stack test results that Stauffer provided to us.

ATSDR notes that the comment correctly indicates that our modeling analysis likely over predicts ambient air concentrations during times when the rotary kiln was not operating. In fact, some permit records we reviewed suggest that the kiln operated approximately 80% of the time. The comment fails to acknowledge, however, that our modeling analysis likely under predicts air concentrations during times when sulfur dioxide emission rates were unusually high (e.g., during process upsets and when air pollution control devices were not functioning properly).

Taking all of the site records together, ATSDR still believes that the emission rates we used are reasonable and based on the best available information. We state throughout the PHA that the modeling analysis has uncertainties: the analysis likely over predicts air quality impacts for some time periods and under predicts air quality impacts for others. However, the general agreement between the estimated and observed sulfur dioxide concentrations for the different time frames provides an added level of comfort that our modeling analysis provides a realistic account of past air quality conditions near the Stauffer site. To address this comment, we made minor changes to more prominently acknowledge inherent uncertainties in the modeling analysis, but these uncertainties do not affect our main conclusions for the site.

<u>Comment #9:</u> In addition, the large uncertainties associated with the method of subtraction that is used to quantify the contribution of the Stauffer plant to measured ambient air pollutant levels are not clearly communicated in the PHA. For SO2, this method of subtraction of pre- and post-closure concentrations is used to estimate the annual average SO2 concentration of 4.9 ppb that ATSDR uses to represent 1979-81 (i.e., after the 1979 stack modification) SO2 air quality impacts of the Stauffer facility in Table 30. This method of subtraction implicitly assumes that contributions from all other sources with measurable impacts on the Anclote Road monitoring station also did not change in the time period when the facility closed. Additional supporting information is thus needed to justify the use of this method of subtraction, which may overestimate the impacts of the

Stauffer facility, as other sources also reduced emissions around the time the plant closed. As noted by ATSDR, SO2 levels went down generally over time, so it is not appropriate to assume that other sources stayed static.

ATSDR Response: This comment correctly states that emissions sources of sulfur dioxide other than Stauffer might have accounted for part of the difference between the observed and measured concentrations of sulfur dioxide (see Table 30). ATSDR has revised text in Section 3.3.3.3.2 to account for this possibility. However, ATSDR has also revised this section to indicate that past modeling analyses conducted by multiple parties concluded that emissions from Stauffer accounted for the overwhelming majority of sulfur dioxide detected in the late 1970s at the Anclote Road monitoring station. Specific conclusions reached by these parties are summarized below:

- In 1978, consultants to Stauffer performed a modeling analysis and concluded that "the high concentrations of SO2 that have been observed in the vicinity of the Stauffer Chemical plant were due almost entirely to the emissions of SO2 from the phosphate kiln stack located within the plant boundaries," and that "the contribution by the [Anclote Power] plant [to sulfur dioxide levels] was generally insignificant and typically less than 5% of each best predicted concentration" (Dames and Moore 1978).

- Documents prepared by the Florida Department of Environmental Regulation also comment on the suspected causes of the elevated sulfur dioxide levels observed in the late 1970s near Stauffer. An internal agency memo, for example, concludes: "it is clear that emissions from the Stauffer Chemical Company kiln stack are responsible for the SO2 ambient violations in northern Pinellas County" (George 1978). Similarly, the Florida State Implementation Plan notes that modeling analyses "revealed that the [sulfur dioxide] violations were a direct result of emissions from the Stauffer nodulizing kiln" (SIP, no date).

- Consultants to Florida Power Corporation also conducted a modeling analysis, and their main conclusion was that "the measured violations of ambient air quality standards at the Pinellas County station are not of Anclote Plant origin" (Sholtes & Kolger 1978).

These observations, combined with the findings of our modeling analysis and trends among the ambient air monitoring data, strongly suggest that air emissions from Stauffer accounted for the overwhelming majority of airborne sulfur dioxide detected near the facility, contrary to what the comment suggests. The text we added to Section 3.3.3.3.2 briefly summarizes the content in this response.

Comment #10: There are two primary (i.e., health-based) NAAQS for SO2: 140 ppb for 24-hour average concentrations, and 30 ppb for the annual arithmetic average. It is useful to recall that the NAAQS are based on a critical review and synthesis of all the available scientific information by the EPA and critical review by an independent committee, the Clean Air Scientific Advisory Committee (CASAC). The NAAQS are set at levels intended

to protect the public, including sensitive populations, against adverse health effects with an adequate margin of safety. The same SO2 primary standards in place today were also in place when the Stauffer facility was in operation. Importantly, the 1977-1982 annual average sulfur dioxide levels shown in Table 44 of the PHA are all well below the annual average NAAQS of 30 ppb, but this comparison is never discussed in the assessment of long-term exposures to sulfur dioxide.

ATSDR Response: ATSDR has added a discussion of EPA's National Ambient Air Quality Standard for sulfur dioxide.

On January 9, 2001, EPA published a notice in the Federal Register about information available for acute exposures to sulfur dioxide. These quotes are taken from the Federal Register:

"The EPA is announcing today the following actions: the availability of new information on 5-minute average sulfur dioxide concentrations in the ambient air; the status of EPA's ongoing activities to characterize and address 5-minute peak sulfur dioxide levels that may pose risk to sensitive individuals with asthma, including plans to consider taking final action on the proposed intervention levels program (ILP) for the reduction of sulfur dioxide emissions published on January 2, 1997 . . ." (Federal Register Vol 66, No. 6, page 1665–1668)

The Federal Register goes on to state, "The sensitive population for the effects of 5-minute peaks of sulfur dioxide consists of children, adolescents and adults with mild or moderate asthma who are physically active outdoors." EPA decided not to develop a national 5-minute standard because the agency believed that 5-minute peak exposure was not a ubiquitous public health problem. EPA decided that short-term peak sulfur dioxide levels were most appropriately addressed as a localized problem by states. Instead of a national 5-minute standard, EPA proposed an intervention program to assist states in determining if they had a local health problem from short-term peak levels of sulfur dioxide. The Federal Register goes on to state that EPA considers 0.6 ppm as a level of concern and 2 ppm as an endangerment level. The Federal Register mentions the following criteria should be considered when evaluating 5-minute exposures to sulfur dioxide:

- magnitude and frequency of peak sulfur dioxide levels,
- the history and nature of citizen complaints,
- available information about potential exposure of sensitive individuals with asthma, and
- information about the sources causing the peak sulfur dioxide levels.

Therefore, it is incorrect to conclude that the annual and 24-hour NAAQS are set to protect all sensitive individuals. It is clear from the scientific literature and from EPA's own statements in the Federal Register that the annual and 24-hour NAAQS standards do not protect from short-term exposures people with asthma who exercise outdoors. ATSDR's evaluation of the risk of harmful effects from acute exposures to sulfur dioxide evaluated all of these factors previously mentioned. It should also be pointed out that EPA's last critical review of the health effects from long-term (i.e., chronic) exposure to sulfur dioxide was published in the Federal Register in 1996 (Federal Register, Volume 61, No. 100, pages 25566 to 25580, May 22, 1996). Subsequent EPA publications in the Federal Register concerning sulfur dioxide have focused on acute 5-minute sulfur dioxide levels.

ATSDR's evaluation of possible health effects from chronic exposure to sulfur dioxide are based on more recently published results from two major scientific studies than those EPA had available for its 1996 Federal Register notice. In a 2002 scientific publication, the American Cancer Society updated the results of their study concerning sulfur dioxide. Furthermore, in 2000, the Health Effects Institute published a review of the American Cancer Society Study and another major study, the Harvard Six Cities Study.

Comment #11: In assessing SO2 risks, the ATSDR used data from research by Sheppard et al (1981, 1984) in which exercising asthmatic human subjects were exposed to 100 or 250 ppb of sulfur dioxide via a mouthpiece. Subtle transient changes in pulmonary function and symptoms were observed in that study to be associated with exposure to sulfur dioxide. These changes are not unlike those observed when asthmatic individuals are exposed to a number of non-immunological provocative stimuli such as dry air or cold air. There is actually a large body of data available on the acute effects of human subjects exposed to sulfur dioxide. In fact, the EPA, in its 1994 publication on air quality for particulates and sulfur oxides, ("EPA (1994)") has reviewed and synthesized all of the available literature (including 36 reports on human clinical studies) on the acute effects of exposure to sulfur dioxide. Significantly, the report was reviewed by an independent panel, the EPA CASAC, on two occasions, and the final report took account of the panel comments.

Most studies do not show any effects until SO2 concentrations are 200 ppb or greater, even in individuals with asthma. Even at SO2 concentrations of 200 ppb or greater, any potential respiratory effects would be minimal and not of clinical significance. Furthermore, the effects observed are all readily reversible, and would not result in any persistent adverse health effects. The EPA (1994) estimates that only 10-20% of individuals with mild or moderate asthma would likely exhibit decreased lung function at 200-500 ppb SO2 during moderate exercise that would be greater than that experienced due to other commonly encountered stimuli, such as exercise alone or cold/dry air. Only a very small percentage might experience noticeable asthma-like symptoms at these concentrations, but again the symptoms experienced at these low concentrations are mild in nature, are not considered to be of medical concern, and are expected to be short-lived and readily reversible.

In its 1986 "Air Quality Criteria for Particulate Matter and Sulfur Oxides (Second Addendum)", EPA reviewed several studies in individuals without asthma. The majority of these studies indicate that there are no serious respiratory effects in individuals without asthma (or other serious respiratory problems) at SO2 concentrations up to 1,000 ppb. There were only two studies that reported effects in individuals without asthma at SO2 concentrations greater than 1,000 ppb. These studies reported effects at 2,000 and 5,000 ppb, but even those effects would not be considered clinically significant. The literature thus supports the scientific conclusion that health effects from exposures to up to 1,000 ppb are short-lived and reversible. In its discussion of the Sheppard study, the ATSDR focuses all of its discussion toward subtle effects on exercising asthmatics breathing through mouthpieces in a laboratory, which overestimate actual effects from normal breathing. This focus not only exaggerates the level of concern for asthmatics – it also diverts the

public's attention from the fact that non-asthmatics would not likely have suffered any ill health effects at the highest levels referenced by the PHA. The PHA extensively focuses on 100 ppb as an important health response level for measurable but imperceptible responses in exercising asthmatics based on the Sheppard study, and then only briefly mentions that higher effect levels are of more relevance for mild and reversible, noticeable responses in exercising asthmatics (e.g., 500 ppb) and in the general population (e.g., 1,000 ppb). Moreover, it should be noted that even for exercising asthmatics, effects from SO2 exposures up to 1000 ppb are reversible. This is reflected in the fact that exposures of this magnitude have been permitted by Institutional Review Boards in clinical exposure studies; such exposures would not be permitted if there were a possibility of irreversible effects. This gradation of response levels, both between different groups of individuals (e.g., exercising asthmatics, non-exercising asthmatics, the general population) and for different types of responses (e.g., imperceptible vs. noticeable, minor vs. serious, reversible vs. non-reversible), is a key concept and should be more clearly made in the evaluation.

ATSDR Response: ATSDR's Toxicological Profile for sulfur dioxides classifies adverse effects into two categories: less serious adverse effects levels ("less serious LOAELs") and serious adverse effect levels ("serious LOAELs"). In general, ATSDR classifies as a less serious LOAEL increased airway resistance. However, the agency classifies increased airway resistance when it leads to wheezing and chest tightness as a serious LOAEL. In its discussion of various responses to sulfur dioxide from brief exposures, the agency points out that brief exposure to 100 ppb sulfur dioxide causes transient increases in airway resistance, and points out that airway resistance will return to normal once exposure ceases. ATSDR wishes to point out to the commentor that the increased airway resistance is an indicator of bronchoconstriction, which if severe enough causes the more serious wheezing and shortness of breath. Wheezing and shortness of breath are two important signs and symptoms indicating an asthmatic attack. While the commentor believes that wheezing and shortness of breath are mild symptoms, a review of the studies cited in Table 40 shows this not to be the case in some people. For example, after exposing seven exercising persons with asthma to 500 ppb sulfur dioxide for 3 minutes, two persons required the use of bronchodilators to relieve the symptoms of wheezing and shortness of breath (Bethel et al. 1984). In another experiment where exercising asthmatics were exposed to 500 ppb sulfur dioxide for 10 to 75 minutes, one subject had to withdraw from the experiment because of pronounced wheezing (Roger et al. 1985). While the signs and symptoms are reversed, they are not minor in some people with asthma.

It is also important to realize that some of these low-level exposures to sulfur dioxide have occurred in breathing chambers. Several researchers used a chamber to expose exercising asthmatics to 250 ppb and detected an increase in airway resistance or a decrease in air flow rate (Bethel et al 1985; Schachter et al. 1984; Hortsman et al. 1986). During exercise, people change from breathing through their nose to breathing more through their mouth; therefore, exposures at 100 ppb via a mouthpiece comes close to mimicking environmental exposures while exercising.

Several other factors are also important when deciding a level of concern for short-term exposures to sulfur dioxide. Many of the researchers used subjects with mild asthma; therefore, the effects of sulfur dioxide on people with moderate to severe asthma are not well-studied.

Also, only a limited number of persons with asthma have been studied; therefore, it is likely that the various exposure levels and responses only partially characterize the range of possible reactions in exposed subjects.

It is unclear why the commentor believes that ATSDR is overemphasizing 100-ppb sulfur dioxide. In its discussion of the harmful effects from brief exposure to sulfur dioxide, the text mentions 100 ppb in only a few sentences and then explains that the effects are "temporary and go away after exposure stops." The discussion then proceeds to describe the effects that occur from brief exposure to 500-ppb sulfur dioxide. This level is toxicologically significant because it will cause some exercising asthmatic people to use medication to treat their signs and symptoms of wheezing and tightness of the chest. Because these effects are documented in the scientific literature, they should not be ignored in ATSDR's assessment of possible harmful effects. It should be pointed out that sulfur dioxide levels were likely much higher than the 1-hour average levels for which data are available at the Anclote Road monitoring station.

Comment #12: ATSDR does not issue any specific recommendations regarding SO2. In view of the foregoing discussion, this is not surprising since all of the health effects that the PHA discusses were in the past and focus on an area within a 1540-foot radius of the kiln in which a limited number of people would have been present at all, let alone in the path of an actual SO2 plume. Further, at the measured levels, at worst, the only people who were at a theoretical risk of past harmful effects would have been asthmatics, and those effects would have been reversible. In short, the weight of the scientific evidence does not support a conclusion of increased health impacts in or around the Site, and the very minor nature of the physiological effects at levels measured near the plant should have been emphasized.

ATSDR Response: It is important that people understand the degree of risk they might have experienced depending on what is known about past exposure to sulfur dioxide and other air pollutants coming from the Stauffer facility. These past exposures to sulfur dioxide may be relevant for other reasons to people who lived near the Stauffer facility when it was operating.

As pointed out on page 82 of the public release version of the public health assessment, sulfur dioxide levels for brief periods (e.g., 10 minutes or 30 minutes) might have been as high as 2,600 ppb. In its recent Federal Register notice, the EPA has identified sulfur dioxide levels above 2,000 ppb as an endangerment level.

Comment #13: The PHA states that deposition was not handled in the air dispersion modeling analysis due in part to the lack of particle size distribution information for the stack emissions (PHA at page 55). ATSDR's omission is hard to understand, since they used and assumed particle size distributions for other purposes in their analysis. The PHA goes on to say that, "omitting deposition is expected to have only marginal effects on the concentrations predicted for receptors nearest the facility." (PHA at page 55.) In fact, by failing to account for deposition, the ATSDR model overestimates PM levels 1540 feet from the kiln by as much as 25% -- and this only accounts for dry deposition. Ignoring wet deposition also causes overestimation in the ATSDR model.

ATSDR Response: This comment questions ATSDR's decision to perform its dispersion modeling analysis without considering particle deposition. ATSDR did not explicitly account for deposition due to the lack of information on particle size distributions in stack emissions and the belief that omitting deposition would have only marginal effects on the ambient air concentrations estimated for receptors located nearest to Stauffer. The comment takes exception to our decision and adds that omitting deposition caused the model to overestimate particulate matter levels for receptors located close to Stauffer "by as much as 25%." However, the comment provides no specific information on exactly how this factor of 25% was derived.

ATSDR notes that the air concentrations predicted by ISCST3 are not affected by whether particle deposition is selected. This means that for a given set of emissions sources and meteorological data, ISCST3 will predict the exact same ambient air concentrations in simulations that consider deposition as those in simulations that do not consider deposition. ATSDR verified this with supplemental air dispersion modeling analyses.

The comment appears to refer to considering plume depletion mechanisms in ISCST3. The plume depletion algorithms in ISCST3 are theoretical calculations that estimate the amount of particles deposited on the ground from air emissions. The estimated mass of deposited particles is then subtracted from the amount of particles that remain airborne. Use of this model option at Tarpon Springs does cause predicted concentrations of particulate matter to be lower. If one assumes that all of the particles emitted are PM10, for instance, predicted concentrations at the Anclote Road monitoring station would be 57% lower. While selecting certain combinations of input parameters can generate lower results for this site, ATSDR believes rigorous modeling analyses should be based on a scientific understanding of the transport mechanisms incorporated into the model. ATSDR questions the validity of using the plume depletion modeling option at Stauffer for several reasons:

- The air dispersion parameters in ISCST3 were originally fit to field observations and mathematical equations that do not account for depletion. Therefore, application of plume depletion algorithms is essentially asking ISCST3 to make calculations for scenarios beyond which the model was originally designed and parameterized to do.

- ATSDR is not aware of any model performance evaluation studies in the scientific literature that demonstrate how reasonably ISCST3 predicts ambient air concentrations when plume depletion algorithms are activated.

- EPA's regulatory default options for ISCST3 modeling do not consider use of plume depletion.

- Even if the current plume depletion algorithms are found to be scientifically sound, the utility of the algorithms in this application is questionable without detailed information on particle size distribution of emissions. The extent of particle deposition is highly dependent on particle size. Our test simulations of the plume depletion algorithm were based on 100% of emissions being coarse particles (PM10).

ATSDR has identified many sources, however, suggesting that emissions from the high temperature sources at Stauffer were likely dominated by fine particulate. These sources include documents prepared for other elemental phosphorus production facilities that ATSDR has evaluated, statements in EPA's emission estimate guidance document (AP-42) pertaining to phosphate rock processing facilities, entries in EPA's "SPECIATE" database for elemental phosphorus plants, the relative amounts of soluble and insoluble particulate detected in Stauffer's emissions, and a Stauffer site inspection report prepared by EPA contractors.

Perhaps most telling is the fact that Stauffer itself has indicated that "in general, most of the particulate [from the furnace scrubber emissions] is less than 0.5 micron" (Hebel 1974). This statement was based on a stack test at Stauffer using an Andersen Particle Sizing Sampler, but the raw data on the particle size distribution were not provided to ATSDR for review. Taken together, these observations strongly suggest that particulate matter emissions from the sources we modeled were likely dominated by fine particles, for which any amount of deposition would be minimal. Conclusions from past EPA inspections are consistent with our judgment. Specifically, site inspectors previously concluded that emissions from Stauffer's furnace were of "submicron nature," and this "particle size does not allow material deposition" (PEDCO 1979). Therefore, even if the plume depletion algorithms in ISCST3 are later shown to generate reasonable results, the particulate matter emitted by Stauffer's high temperature operations would be comprised mostly of fine particles, which do not deposit readily.

For the reasons stated above, ATSDR continues to believe that the input options selected for the dispersion modeling analysis are appropriate, consistent with typical regulatory default simulations, and based on the best available information for this site.

On a more general note, ATSDR disagrees with the suggestion in the comment that our dispersion modeling analysis systematically overstates ambient air concentrations of particulate matter. As stated numerous times in the PHA, we have reason to believe that our modeling analysis understates actual air quality impacts from Stauffer because the information on all past particulate emissions from the facility is not complete. For instance, no data are available on fugitive emissions of particulate matter from Stauffer, though site documents do identify specific sources (e.g., the furnace) as being fugitive emissions sources. At another elemental phosphorus production facility we recently evaluated, fugitive emissions accounted for 31% of the total emissions of PM_{10}. Further, our modeling analysis does not evaluate emissions from Stauffer's slag processing operations, which reportedly caused considerable particulate releases. Thus, we continue to believe that our modeling analysis offers a reasonable account of the particulate emissions sources that were characterized, but likely understates Stauffer's overall contribution to off-site air quality due to the fact that regulators did not require Stauffer to characterize several potentially important emissions sources. Our response to Comment #15 includes additional reasons why we believe that our modeling analysis likely understates Stauffer's air quality impacts of particulate matter.

<u>Comment #14:</u> The PHA states that Stauffer's contribution to PM levels at the Anclote Road monitoring station was likely understated, because it did not account for PM from fugitive emissions (PHA at page 56). In fact, the fugitive emissions accounted for a very

small percentage of Stauffer's emissions, and the limited fugitive emissions were most impacted by deposition due to the larger size of the particles.

ATSDR Response: The comment makes two claims about Stauffer's fugitive emissions of particulate matter: that these emissions accounted for a relatively small portion of the total emissions, and that these emissions were primarily coarse particles. The comment provides no detailed information to support these claims. ATSDR's responses to these two general comments are as follows:

1. Magnitude of Stauffer's fugitive emissions of particulate matter. The comment states that "fugitive emissions accounted for a very small percentage of Stauffer's emissions" of particulate matter. Our response to Comment #13 lists several reasons why we disagree with this statement, based on our experience with other elemental phosphorus production facilities and our knowledge of many sources (e.g., the furnace, slag processing operations) for which data on fugitive emissions of particulate matter are not available but emissions are believed to be considerable. As an example of our concern, an inspection report prepared by an EPA contractor indicates that the air pollution controls at Stauffer's furnace were "generally unable to capture the major portion of generated fumes" (PEDCO 1979). Such fumes that escaped from the furnace, without being vented through a pollution control device, were fugitive emissions and were not accounted for in ATSDR's dispersion modeling analysis.

2. Particle size distribution of Stauffer's fugitive emissions. The comment asserts that the "limited fugitive emissions" of particulate matter from Stauffer would have limited air quality impacts because most particles would settle to the ground "due to the larger size of their particles." However, the comment does not substantiate why fugitive emissions would be dominated by larger particle size fractions. Although ATSDR agrees that fugitive emissions from wind-blown dust and from crushing and grinding operations typically contain larger particles, a site document suggests that the furnace—one of the more significant emissions sources at Stauffer—primarily released fine particles. Specifically, a 1979 site inspection report prepared for EPA indicates that air emissions from the furnace were of "submicron nature" and this "particle size does not allow material deposition" (PEDCO 1979). Therefore, the available site information, though limited, does not support the assertion that fugitive emissions of particulate matter from Stauffer were primarily larger particles.

Overall, the comment suggests that Stauffer's fugitive emissions of particulate matter had limited air quality impacts due to the magnitude and size distribution of the particles released. For the reasons stated in our response, ATSDR continues to maintain that its modeling analysis likely understated actual ambient air concentrations of particulate matter due to the lack of information on fugitive emissions. The extent to which we have underestimated the particulate air quality impacts is not known.

Comment #15: Significantly, ATSDR's modeling inputs estimate emissions from each source at the highest measured rate. This technique causes the modeling of aggregate

emissions to report PM levels that were never actually emitted. This mixing and matching of data to create the highest possible result is not a scientifically valid modeling technique, because it is highly unlikely that all seven stacks were emitting at maximum rates at the same time, let alone continuously throughout every year.

ATSDR Response: The comment questions how we characterized particulate matter emissions in our air dispersion modeling analysis, but several of the statements in the comment are incorrect. For instance, the comment suggests that we selected specific emission rates in an effort to generate the "highest possible result." To the contrary, the emission rates used in our modeling analysis are based entirely on emissions data that Stauffer provided. In particular, for five of the seven emissions sources we considered, ATSDR used emission rates documented in annual emissions disclosure statements that Stauffer submitted to Florida regulatory agencies. These disclosure statements are supposed to reflect actual emissions, not the "highest measured emission rate," as the comment suggests. In fact, Stauffer's cover letter for the 1974 disclosure states "the information [in the disclosure] was compiled from our yearly operating data reports and is the most accurate information obtainable" (Stark 1975). Cover letters for other annual disclosures make similar claims regarding the accuracy of the emissions data.

Further, our modeling analysis did not consider particulate emissions from many sources that Stauffer and environmental regulators had not studied at the time, such as the slag processing operations, uncontrolled releases from the furnace, slag pits, storage piles, wind-blown dust, and other fugitive emissions sources. For these reasons, we strongly disagree with any suggestion that we constructed a dispersion model to intentionally overstate air quality impacts. Rather, ATSDR continues to maintain that our modeling analysis presents a reasonable account of particulate matter air quality impacts, based on the best available information. Our modeling analysis likely understated actual particulate matter air quality impacts because we did not consider emissions from sources that had not been characterized.

Finally, as further evidence that our modeling analysis likely understates actual air quality impacts, ATSDR notes that a 1980 Stauffer analysis of particulate matter levels near its facility reaches conclusions similar to our modeling results (Davis 1980). In Stauffer's study, modelers attempted to identify the sources that most likely contributed to TSP levels observed at the Anclote Road monitoring station on 28 days with some of the highest concentrations. From all days combined, the study concluded that emissions from Stauffer accounted for 36.3% of the airborne TSP that was measured (Davis 1980). In contrast, our modeling analysis found that Stauffer's emissions accounted for a smaller percentage of observed levels, most likely because the emission rates we used and sources we considered did not provide a comprehensive account of Stauffer's past particulate matter emission rates.

In summary, for the reasons listed above, ATSDR disagrees with several points raised in this comment. We have added text in the Executive Summary and Conclusions of the PHA to clarify our position on the air dispersion modeling analysis.

Comment #16: In addition, the large uncertainties associated with the method of subtraction that is used to quantify the contribution of the Stauffer plant to measured ambient air pollutant levels are not clearly communicated in the PHA. Specifically, for

PM, ATSDR concludes on page 92 that it is their "best estimate" that Stauffer emissions contributed 7 ug/m3 to annual average PM2.5 levels at the Anclote Road monitoring station based on the difference in estimated PM2.5 levels for the years 1977 to 1981 prior to plant closure and estimated PM2.5 levels for the years 1982 to 1989 after plant closure. This method of subtraction implicitly assumes that contributions from all other sources with measurable impacts on the Anclote Road monitoring station also did not change in the time period when the plant closed. Additional supporting information is thus needed to justify the use of this method of subtraction, which likely overestimates the impacts of the Stauffer plant as other PM sources (which were significant) also likely reduced emissions around the time the plant closed. Indeed, at page 98, ATSDR notes that decreased air pollutant emissions was the trend in many areas throughout the U.S. in the 1980s and 1990s; thus, it would not be appropriate without further information to connect the Stauffer plant's closure to all of the decrease in PM levels at the Anclote Road monitoring station.

ATSDR Response: The comment addresses how ATSDR estimated exposure point concentrations for particulate matter, but primarily for $PM_{2.5}$. ATSDR used two different approaches to make its estimates. One was our modeling analysis, which found that Stauffer's air emissions likely contributed 4 $\mu g/m^3$ to the annual average $PM_{2.5}$ levels at the Anclote Road monitoring station. The other approach estimated Stauffer's contribution to $PM_{2.5}$ levels, based on assumptions regarding the ambient particle size distribution and Stauffer's contribution to observed TSP levels. That approach found an estimated $PM_{2.5}$ level to be 7 $\mu g/m^3$. In the public comment release PHA, ATSDR used 7 $\mu g/m^3$ as an estimated annual average exposure level concentration for $PM_{2.5}$ at the Anclote Road monitoring station due to concerns that our modeling analysis might have understated Stauffer's actual contribution to $PM_{2.5}$ levels. Given the content of this comment and upon further evaluation of the total information available, ATSDR is now expressing the estimated exposure concentration as a range. Specifically, we have revised text on page 92 to state "ATSDR believes that Stauffer's air emissions likely contributed between 4 and 7 $\mu g/m^3$ to annual average PM2.5 levels at the Anclote Road monitoring station. This estimated range does involve some uncertainty, and the actual contribution to $PM_{2.5}$ levels at this location might be lower or higher than the range stated above."

Comment #17: Like SO2, PM is among the six criteria pollutants for which the Clean Air Act directs EPA to develop NAAQS that "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of [a] pollutant in the ambient air." EPA is required to establish primary standards at the level that "in the judgment of the Administrator, based on the criteria and allowing an adequate margin of safety, [is] requisite to protect the public health." The legislative history for the Clean Air Act specifically identifies asthmatics as a sensitive subpopulation that is to be protected by primary standards. The "margin of safety" requirement is intended to address uncertainties in the available scientific and technical information, and to provide a reasonable degree of protection against harms that may be identified in the future. As health-based protective standards, the primary NAAQS are highly relevant to a public health evaluation of PM, and they should be utilized in the PHA as a key line of evidence in

the assessment of public health risks. During the time of operation at the Stauffer plant, the PM standards in place were for TSP. Importantly, the 1977-1989 annual average TSP levels shown in Table 48 of the PHA are all below the annual average NAAQS of 75 ppb. These comparisons indicate that the EPA would not have considered long-term TSP exposures to be of public health concern. The PHA conclusions regarding short-term and long-term exposures to TSP cannot be reconciled with the lack of exceedances of the health-based PM NAAQS.

As noted earlier, the NAAQS are set at levels that will protect the public, including sensitive populations, from adverse health effects with an adequate margin of safety. This was done first for the TSP indicator, then the PM10 indicator, and more recently for the PM2.5 metric. From 1971-1987, TSP measurements were used to determine compliance with the NAAQS for PM. This corresponds with the last years of the Stauffer plant operation and its closure, the time period evaluated in the PHA. The primary NAAQS for TSP was set in 1971 at 260 µg/m3, 24 hour averaging time, and 75 µg/m3, annual average. Because the NAAQS was based on TSP measurements, this indicator was used in sampling to ensure compliance with the applicable regulations. This included measurements made at the Stauffer facility and nearby monitoring stations. In 1987, the EPA replaced the TSP standard with a PM10 standard. The new PM10 NAAQS was set at 150 µg/m3, 24-hour averaging time, and 50 µg/m3, annual average. A PM2.5 NAAQS was promulgated by the EPA in 1997. The new PM2.5 NAAQS was set at 65 µg/m3, 24 hour averaging time, and 15 µg/m3, annual average.

The PHA acknowledges that the measured concentrations of TSP never exceeded the NAAQS for TSP applicable at the time the plant was operating (PHA at page B-72). However, the PHA fails to explicitly acknowledge that compliance with the standard indicates that regulatory agencies such as the EPA would not have considered Stauffer PM emissions to constitute a public health concern at that time. Compliance with air quality standards such as the NAAQS should be considered in an evaluation of potential air quality health impacts since they are developed to be protective of human health, including that of sensitive subpopulations.

ATSDR Response: ATSDR addresses these issues in our responses to several other comments. Those responses are repeated below to specifically address these comments.

None of the annual geometric mean concentrations or 24-hour average concentrations were higher than EPA's former health-based air quality standards for TSP (75 ug/m^3 and 260 ug/m^3, respectively). However, many states implemented more stringent air quality standards for TSP. Florida's air quality standards for TSP, for example, were 60 ug/m^3 for annual geometric mean concentrations and 150 ug/m^3 for 24-hour average concentrations. As Table C-6 indicates, the annual geometric mean concentrations at the Anclote Road monitoring station were higher than the state of Florida's standard from 1977 to 1981. Further, 24-hour average concentrations at the Anclote Road monitoring station exceeded the state of Florida's air quality standard on 8 days between 1977 and 1981.

For some PM sources that consist of primarily of larger particles (like dust storms), the previous TSP standard was probably protective of public health. However, since this standard was in place, much has been learned about how particle size is related to adverse lung and heart effects; that is, the smaller or finer particles are more likely to be associated with these adverse health effects. Because of this knowledge, the EPA has moved towards making the PM standard a measure of the smaller-sized particles (by first implementing a PM10 and then a PM2.5 standard). Therefore, since ATSDR believes that it is likely that Stauffer and other sources in the area contributed appreciable amounts of fine particles to overall PM loading and exposures, it is possible that the previous EPA TSP standard in the area of Stauffer Chemical was not as protective of public health as the Florida standard.

ATSDR discusses the EPA's National Ambient Air Quality Standards on page 59 of the public release version of the health assessment. ATSDR will review the public health assessment to ensure that proper reference is given to national ambient air quality standards.

<u>Comment #18:</u> The PHA acknowledges that PM is "ubiquitous and comes from multiple outdoor and indoor sources" (PHA at page 86). However, the PHA provides little detail regarding common sources of ambient PM. This is extremely important information to convey to the public, as PM exposure is an inescapable reality in any outdoor or indoor environment.

As was pointed out in the peer review comments, an individual's exposure to PM derives from many sources, of which ambient PM is just one. The PHA provides an estimate that 32 percent of the TSP measured at the Anclote Road monitoring station originated from the Stauffer plant. This does not directly correlate to any individual's personal exposure to PM. An individual's personal PM exposure can be dominated by sources in the indoor environment (e.g., cooking, cleaning, activity, cigarette smoke, resuspended soil) and the local outdoor environment (e.g., charcoal smoke, wood smoke, garden equipment engines, fugitive dust) rather than by the ambient PM collected at central monitors. In the Tampa-St. Petersburg-Clearwater area, such localized PM sources as residential open-waste burning and wood-burning have been shown to contribute approximately 5 percent of the total primary PM10 emissions in the region. On an individual basis, these residential sources could dominate personal exposures to ambient particles, not only for the properties where the burning is occurring, but also within the local area.

Given that on average people spend about 90% of their time indoors, it should not be surprising that studies have shown that most PM exposure occurs indoors where people can be exposed to a number of local indoor PM sources. For example, indoor appliances such as natural gas stoves and heaters, kerosene heaters and wood-burning fireplaces can produce PM. In addition, indoor activities such as cooking and cleaning produce particulate matter. Due to the low air turnover rates typically found in many homes as well as their close proximity to the emissions source, people can experience high levels of exposure to indoor PM.

Although the PHA notes that the Stauffer plant was not the primary source of PM in the surrounding area during its years of operation (see PHA at page 45, "other local emissions

sources . . . accounted for a large portion of the measured TSP levels"), the PHA should explicitly acknowledge the contributions of not only outdoor air sources, but also indoor and personal sources to total PM exposures.

ATSDR Response: The comment correctly notes that various indoor and personal sources of particulate matter emissions contribute to inhalation exposures, and ATSDR agrees with this comment. The following sections of the public comment release PHA already noted that indoor sources contribute to overall exposure: the Executive Summary (see page 6), Section 5.3 (see page 86), and the Conclusions (see page 143). Similarly, we acknowledged the impacts of smoking (a personal source of particulate exposure) in the same sections of the public comment release PHA. We did not insert additional text in the PHA on indoor and personal sources of particulate matter emissions, because these other sections of the document already address the topic.

Comment #19: As was mentioned in the peer review comments, the PHA heavily relies on epidemiological studies without clear acknowledgment of the strengths and weaknesses of these types of studies, including the role of confounders, ambient co-pollutants, and exposure misclassification/ measurement error. Most people will not be familiar with epidemiology and should be informed that epidemiology provides statistical associations and not causal information. This is especially true for PM, where epidemiological studies have reported only relatively small effects. Due to the inherent limitations of the epidemiological studies, toxicological evidence of a biologic mechanism is necessary to establish a cause-and-effect relationship between PM and various health effects. Currently, mechanistic evidence is preliminary and incomplete for PM health effects, reflecting the hypothesis generation stage rather than hypothesis testing.

The PHA acknowledges the limited number of available studies on PM toxicology (briefly summarizing them in the appendix), which have developed over the "past 20 years" – in other words, since the plant shut down (PHA at page 87). However, the PHA fails to give adequate consideration to the existing data. In particular, the PHA relates urban combustion particles to a variety of biologic responses, but it does not note that the studies reporting those findings were typically conducted at very high particle levels (e.g., hundreds to thousands of ug/m3) with unrealistic exposure conditions (e.g., intratracheal instillation, mouthpiece exposures, tracheostomy). Although study results such as these provide evidence of the biological plausibility of PM toxicity at high concentrations and extreme exposure conditions, their relevance to human inhalation exposures at lower ambient concentrations is uncertain at best.

The PHA attempts to offer a rationalization of its extensive discussion of PM10 and PM2.5 associated health hazards with the following statement:

> **It is important to note that some scientific debate is occurring about levels of PM2.5 and PM10 considered protective of all segments of the population. Threshold concentrations for PM2.5 and PM10 (i.e., levels below which no adverse health effects are likely) have not been established from the scientific literature. Therefore, the following evaluation of the public health**

implications of exposures to particulate matter incorporates the understanding that no established levels exist below which particulate matter will not cause harmful effects. (PHA at page 87.) (emphasis in original.)

In fact, the EPA has used the available scientific literature to set NAAQS for particulate matter that are intended to protect the public, including sensitive populations, with an adequate margin of safety. The assumption of the lack of a threshold for PM health effects remains the subject of scientific debate, as epidemiological studies are a crude tool that can provide only limited insight on the dose-response relationship at low doses and the presence of a threshold. There is a general lack of biological models of PM effects, let alone models at low doses that can provide insight on the presence of a threshold. The assumption of a linear dose-response model with no threshold that is based on epidemiological evidence with little biological confirmation is a large source of uncertainty, limiting what kinds of sound public health conclusions can be made. The speculative nature of this assumption should be made adequately clear in the PHA, as should the fact that most noncarcinogenic substances have thresholds below which no adverse health effects are likely.

ATSDR Response: The text of the public health implications evaluation of PM exposures (Section 5.3.1) clearly discusses the uncertainty in the PM scientific literature. As stated in the final summary of Section 5.3.1, ATSDR's conclusions are based on an evaluation of the epidemiological literature that strongly suggests ambient PM exposures have affected and may continue to affect the health of U.S. populations. The PHA does not rely solely on the available toxicological evidence to determine the public health implications of exposures to PM from the SCC. Similar comments were received during the peer review of the PHA. ATSDR did add language to the Conclusions and the Executive Summary sections to better clarify some of the limitations and uncertainties on which we based our public health conclusions. Moreover, ATSDR provided additional perspective for the general public to better understand the differences between an association and causality.

Public health assessments typically do not provide a thesis on the merits of epidemiological studies versus toxicological studies. Both disciplines have their inherent limitations when trying to evaluate the potential for adverse human health effects from a particular exposure. For example, although epidemiological studies cannot control potential confounders as rigorously as toxicological studies of animals can, epidemiological studies are of human, not animal populations. Ideally, in any public health evaluation, ATSDR would prefer to have strong support from both the toxicological as well as the epidemiological literature. However, this type of support in the realm of evaluating human exposures to ambient levels of various chemicals is seldom found, and often ATSDR relies on strong support from the evidence from one discipline to make a health conclusion while the evidence from the other(s) may be lacking. Therefore, as stated in the PHA, ATSDR relied mostly on the strong epidemiological evidence that suggests that ambient PM exposures are associated with adverse health outcomes in humans. As stated previously, ATSDR did attempt to provide more perspective in the Conclusions and Executive Summary regarding the limitations and uncertainties in our health call on exposures to PM.

After reviewing comments received from peer review of the PHA, ATSDR did add language to the PM health effects section that discusses the uncertainties with controlled laboratory (animal) studies. Specifically, on page 89 of the public release PHA, it clearly states that the PM effect levels found in laboratory studies were much higher than the levels that have shown effects in epidemiologic studies.

Comment #20: The PHA contains no specific recommendations regarding PM, which is not surprising given the appropriately low level of concern associated with the levels of PM measured in the area surrounding the Stauffer plant, and in view of the fact that the total levels "were not unusually higher than particulate matter levels routinely measured in many suburban and urban settings throughout the state." (PHA at page 92.) It is notable that in its discussion of potential exposures to PM, ATSDR limits the persons who may have experienced adverse health effects to those within 1540 feet of the plant's kiln prior to 1982. The PHA contains no analysis of how many persons were present within that distance, and it is doubtful that many persons, if any at all were present with the opportunity for receiving exposures for acute or long-term effects.

ATSDR Response: The commentor is incorrect in stating that ATSDR is not concerned with past exposures to PM, especially in relation to concurrent SO2 exposures. The primary recommendation or response to a past exposure of concern from ATSDR would be to perform a study or to provide education to the exposed persons or their physicians. Regarding health studies, in this case, given that 20 years or more has past since the exposure from Stauffer ceased, it would be difficult to identify the exposed population; moreover, members of the exposed population have probably had quite diverse exposure experiences over the last 20 years to ambient air pollutants and to other agents. These factors would be difficult to account for in a health study and would mask the ability of a health study to produce definitive results for PM and SO2 exposures from Stauffer Chemical. Regarding informing and educating the public and their physicians, ATSDR's intent is that through the release of this PHA and our outreach activities, our health messages will reach many of the persons who were exposed while Stauffer was operating as well as their physicians.

Comment #21: The PHA reports on several occasions that air emissions from the Stauffer plant did not create adverse health effects for members of the surrounding community. "[I]t is unlikely [because of the low levels of SO2 exposure] that people who were exposed in the past are currently at risk of harmful effects" (PHA at page 145); "it is unlikely that exposure to Stauffer emissions alone resulted in an excess death" (PHA at page 95); "it is unlikely that the most severe health outcome (death) would occur in the population exposed to levels of PM associated with Stauffer emissions" (PHA at page 97); and "ATSDR has not determined that any of the reported illnesses are elevated in the community in relation to exposures from Stauffer" (PHA at page 145). These statements constitute ATSDR's real scientific conclusions and should be prominently displayed in the Executive Summary.

ATSDR Response: The quotes from the PHA provided by the commentor provide only part of the health messages that ATSDR conveyed in the PHA. The complete quotes (messages) from the PHA for the three messages cited above can be found on pages 95, 97, and 147 of the public

release version of the Stauffer Public Health Assessment. The full messages from the PHA are as follows:

From page 95:

"Given that the population exposed to $PM_{2.5}$ attributable to Stauffer may have been lower that 2,000 persons, it is unlikely that exposure to Stauffer emissions alone resulted in an excess death. However, it is important to note that for every death attributable to a long-term increase in $PM_{2.5}$ exposure levels from the HSCS and the two ACS studies, there are likely many more cases of individual symptoms of lung and heart diseases and reductions in lung function. Although ATSDR offers the above perspective for the community to better understand their risk of the most serious adverse health effect, we do so with some uncertainty. Given that the exposed population may have had a higher percentage of elderly (a likely sensitive population), ATSDR cannot completely rule-out any of the adverse health effects that have been associated with PM exposures. In any case, the risk of an adverse cardiopulmonary health outcome was likely reduced once the Stauffer facility ceased operation in 1981 because the levels of exposure to fine particulate matter were lowered."

From page 97:

"The greatest concern for adverse health effects for short-term exposures to the higher levels of TSP would be the elderly and those persons with preexisting heart and lung illnesses. Moreover, as indicated above in the evaluation of $PM_{2.5}$ exposures, the population exposed to Stauffer emissions was relatively small; therefore, it is unlikely that the most severe health outcome (death) would occur in the population exposed to levels of PM associated with Stauffer emissions. It is far more likely that persons exposed in the susceptible populations would experience lung and heart symptoms and reduced lung function that may lead to a doctor's visit, emergency room visit, or hospitalization."

From page 147:

"The consistency between the community's health concerns and the epidemiological studies does not suggest that a specific person's disease was caused by inhalation exposures to particulate matter. Rather, the cause of any disease is usually a result of multiple factors. For example, smoking is a strong risk factor for many lung and heart diseases. Therefore, smokers make up another population group likely at increased risk for particulate matter-related health effects (EPA, 1996). ATSDR has not determined that any of these reported illnesses are elevated in the community in relation to exposures from Stauffer, but only that they are consistent with the findings from the scientific literature."

The quotes provided by the commentor should not be considered "ATSDR's real scientific conclusions". The complete messages above were developed based on comments received during peer review suggesting that ATSDR provide additional perspective on these health messages. These comments, in their entirety, should be considered ATSDR's health messages. A good summary of these and other health and environmental messages can be found in the fact sheets that ATSDR developed and distributed when holding it's public meetings. These fact sheets, which are listed below, can be found in Appendix I:

- Public Health Assessment Summary for Stauffer Chemical Company Site,
- Environmental Health Concerns at Gulfside Elementary School,
- Exposure to Sulfur Dioxide at Stauffer Chemical Company Site,
- Exposures to Particulate Matter (PM) at Stauffer Chemical Company Site,
- Former Worker Exposures at Stauffer Chemical Company Site, and
- Modeling of Air Emissions at the Stauffer Chemical Company Site.

Comment #22: The PHA concludes that the faculty and students at Gulfside currently face no health risks as a result of the Site, and that the Site "is currently not a public health threat because people are not being exposed to contaminants from the site at unsafe levels." (PHA at pages 5, 142.) In addition, with respect to past conditions, the PHA concludes, "[b]ecause of the relatively low levels of exposure from 1978 to 1981, it is unlikely that former students and adults who were exposed in the past are currently at risk of harmful effects." (PHA at pages 11, 58.) Therefore, the ATSDR concludes, " . . . a scientific study of Gulfside former students is not appropriate at this time." (PHA at page 11.) The PHA also concludes that the concentrations of radionuclides measured at Gulfside Elementary School do not pose a health hazard to students or staff. (PHA at page 5.)

ATSDR Response: Comment acknowledged.

Comment #23: There is an unfortunate lack of clarity in some of the ATSDR's findings. For example, the PHA states that arsenic was detected at levels above ATSDR's CV (PHA at page 32). In point of fact, however, arsenic was detected at concentrations below background concentrations.

ATSDR Response: Screening detected concentrations against CVs is a key step in ATSDR's evaluation process. It enables us to identify contaminants that may require further examination. We also consider the possible sources and natural occurrence of detected substances to provide the necessary perspective. ATSDR clearly indicates on page 32 that the detected arsenic concentrations are below background levels and goes on to explain how marginal the CV exceedance was. Such explanations are carried throughout the PHA**.**

Comment #24: As referenced in Section II of these comments, the PHA's conclusion that the Gulfside students "were probably exposed to increased levels of particulate matter (PM) while Stauffer was operating" and "could have" been exposed for brief periods to high levels of sulfur dioxide (PHA at pages 11, 58) is speculative. In fact, the modeling overestimates PM and SO2 levels for the reasons stated in Section II. In addition, the impact of time of exposure is not fully considered in the ATSDR's analysis*.

***The two highest actual SO2 measurements were recorded on Sundays, when school would not have been in session. The highest measurement was also taken at night. Of course, modeling data cannot be used to predict exposures at any given time. However, it appears that in general, the modeled data shows that it was at least as likely that SO2 concentrations would occur at night, rather than in the daytime when the school was occupied.**

ATSDR Response: The comment suggests that ATSDR should have related information on time of exposure to hours when students would most likely have been at Gulfside Elementary School. One observation raised in the comment is that "the two highest actual SO_2 measurements were recorded on Sundays, when school would not have been in session." Although this statement is true, ATSDR does not believe these limited observations provide meaningful insight on exposures at the school, for the following reasons:

- ATSDR believes that focusing on results from just two measurements does not provide a meaningful summary of the monitoring data, especially considering that the Anclote Road monitoring station recorded more than 30,000 sulfur dioxide concentrations while Stauffer operated. As a more representative account of how elevated sulfur dioxide concentrations at the Anclote Road monitoring station varied with day of week, ATSDR examined the days of week on which measured sulfur dioxide concentrations exceeded 500 ppb for at least 1 hour (see page 81 of the public comment release PHA). Of the 20 days when this occurred, 6 (or 30%) fell on weekends and 14 (or 70%) fell on weekdays. This breakdown is almost exactly what one would expect for a site that had emission rates that did not vary considerably with day of week. Therefore, the suggestion that sulfur dioxide near Stauffer consistently reached higher levels on weekends appears to be false.

- The comment implies that the days with highest sulfur dioxide levels observed at the Anclote Road monitoring station would correspond with the days with the highest sulfur dioxide levels at Gulfside Elementary School. ATSDR disagrees with this assumption, given that these two receptors are located in different directions from the Stauffer facility. In fact, one would expect that the days with highest sulfur dioxide levels at Gulfside to be different from the days with the highest levels at Anclote Road (unless the peak concentrations were limited to times with calm winds).

For these reasons, ATSDR does not believe that elevated sulfur dioxide levels at Gulfside Elementary School were somehow limited to weekends. Similarly, we have no reason to believe that elevated sulfur dioxide levels were limited to the daytime or nighttime hours. The data collected at Anclote Road monitoring station indicate that elevated sulfur dioxide levels were observed during all months of the year, during all days of the week and during all hours of the day—a trend that is generally consistent with a somewhat continuous operation being the main influence on air quality. We have added text to Section 5.2.2 to emphasize this point.

Comment #25: For TSP, there would be a significant indoor-outdoor attenuation through air conditioning filters, even for very fine particles (i.e., PM2.5). A recent paper by Riley et al. showed an indoor-outdoor PM2.5 ratio of about 0.4 in residences with central air (i.e., indoor concentrations were about 40% of outdoor concentrations). Thus, the statement of a "2-3 ug/m3 increase in PM2.5 levels at the school" (PHA at page 57) may instead be an overestimate of actual human exposures rather than an underestimate as noted in the PHA, due to lack of consideration of the indoor-outdoor attenuation of fine particles.

ATSDR Response: This comment raises several points, but it mostly addresses the fact that ambient air concentrations of a pollutant are often not equivalent to exposure concentrations. There are many reasons why these terms are not comparable, but the comment here focuses on the fact that people move between indoor and outdoor locations throughout the day and contamination levels vary between these microenvironments. ATSDR does not disagree with these general issues.

ATSDR believes the more important issue is how to interpret properly the estimated exposure concentrations. As our response to Comment #7 indicates, the basis for our health interpretations is epidemiological studies that examined associations between selected health outcomes and ambient air concentrations of particulate matter. Thus, use of ambient air concentrations to evaluate the public health implications of exposure is appropriate in this case, so long as the Tarpon Springs population has activity patterns and microenvironments similar to those for the populations considered in the epidemiological studies. To a first approximation, we believe this is the case. Therefore, we have not changed our conclusions in response to this comment, but we have included additional text in Section 5 that explains the distinction between ambient air concentrations and exposure.

Comment #26: Similarly, the statement on page 57 that the estimated PM2.5 levels at the school may be similar to those predicted at the Anclote Road monitor of "between 2 and 7 ug/m3" is unfounded. The Anclote Road monitor would be expected to have much higher PM levels than the school, because it is much closer to the kiln stack (1540 feet vs. approximately 2500 feet for the school), and the frequency of wind direction from the kiln to the Anclote Road monitor is at least twice the frequency of wind direction from the kiln to the school. It makes no sense to equate air concentrations at two locations that are at different distances from the same suspected source and have very different wind direction frequencies.

ATSDR Response: The comment addresses statements on page 57 of the public comment release PHA regarding estimated particulate matter concentrations at Gulfside Elementary School. The comment suggests that the particulate matter levels at the school and at the Anclote Road monitoring station were likely considerably different, given the prevailing wind directions and the positions of the receptors with respect to the Stauffer facility. While these statements are true, ATSDR notes that the air quality impacts from an emissions source depend on many factors in addition to wind direction and receptor location. These other factors include percentage of calm winds, building downwash considerations, and many other meteorological parameters (e.g., mixing heights, wind speeds). It is the combination of all these factors that governs how emissions disperse for a given source-receptor combination. Our dispersion modeling analysis, which integrates these various factors into a single evaluation, found that estimated particulate matter levels at Gulfside Elementary School resulting from Stauffer's emissions were only 20% lower than the estimated levels at the Anclote Road monitoring station. Therefore, to a first approximation and in the absence of monitoring data collected at the school, we believe that our statements regarding particulate matter levels at the school are appropriate.

For clarity, ATSDR is concerned about site-related past exposures resulting in adverse health effects during 1979–1981, e.g., exacerbation of asthma or cardiopulmonary condition. Potential

adverse effects may have impacted some children and some staff during the period of exposure— that is, from 1979 through 1981.These effects may or may not have been measurable given contemporary epidemiological methods and tools.

Because exposures at the school ceased or were greatly reduced in 1981 and beyond, ATSDR believes that the Stauffer site is not currently having an adverse impact on the school's students or staff.

Comment #27: Although it appears from a review of the peer review comments on the initial draft of the PHA that the ATSDR gave careful consideration to the views of the peer reviewers and made considerable changes to the document in many areas as a result, the same is not true of the portions of the PHA addressing potential exposures and possible health risks for former Stauffer workers. Most portions of this part of the PHA remain substantially the same as in the initial comment draft, despite peer review comments that pointed out significant flaws in the analysis. As a result, those flaws remain.

More troubling is the fact that ATSDR apparently ignored significant available sources of information on worker exposure and worker health in conducting its analysis. Chief among these is the trial record and opinion in Hoyte v. Stauffer Chemical Company, Case No. 98-3024-CI-7 (Pinellas County Cir. Ct. November 6, 2002), a suit brought by several former workers seeking medical monitoring relief on behalf of former non-management employees at the plant. In that case, a four-day evidentiary hearing that took place less than a year ago focused on precisely the issues ATSDR is now concerned with. In that hearing, testimony was taken from five former workers, the former plant manager and multiple experts in industrial hygiene, occupational health, environmental medicine, medical toxicology and medical monitoring. Following consideration of that testimony and 232 exhibits, chiefly consisting of plant records relating to environmental health and safety, personal sampling, and related plant operations, the court issued a 111-page opinion containing 70 pages of detailed findings of fact, many of which address areas where ATSDR concluded it lacked critical information. The Court's opinion was provided to ATSDR, and both the transcript of the hearing and all of the documentary exhibits were both publicly available and could have been obtained from SMC upon request. Yet, the PHA contains no mention of the court's opinion, any of the exhibits or even the existence of the proceeding.

Likewise, ATSDR ignored probably the most pointed source of information concerning plant worker health from the published, peer-reviewed scientific literature -the two epidemiological studies of the Florida phosphate industry performed by Dr. Harvey Checkoway. In the first of those cohort mortality studies, Dr. Checkoway studied 23,000 workers who had been employed at the Florida phosphate industry for more than a year during the period from 1949 until 1978, stratified by industry segment, job category and potential compounds of exposure, to determine whether any pattern of excess disease risk existed. In the second study, published in 1996, Dr. Checkoway extended follow-up of these workers for an additional fourteen years through 1992. Importantly, the Stauffer plant employees and all of the plant sampling data were included in Dr. Checkoway's studies. Yet, apart from an oblique reference in the chapter discussing community concerns (PHA

at page 138) and a listing of the second study in the reference section (PHA at page 158), the PHA contains no mention of the Checkoway studies at all.

For these reasons and numerous others detailed below, we believe the PHA's discussion of Stauffer employee health risks is so flawed as to require wholesale revision. In their present form, the PHA's conclusions and the recommendations that flow from them perform an affirmative disservice to the population of former Stauffer workers. Among the more significant flaws are these:

In evaluating health risks, ATSDR assumed constant exposure to maximum detected levels, 8 hours per day, 40 hours per week, for 20 years and justified that assumption on the basis that it had "no information to determine the length of worker exposures at Stauffer." (PHA at page 123.) Had ATSDR examined the Hoyte opinion, it would have known that precise information exists as to how long each of the Stauffer workers was employed and that the Stauffer plant workforce was a highly transient one: fully 76% of the Stauffer workers were employed at the plant for less than a year; nearly 60% worked there for less than three months.

ATSDR Response: In evaluating non-cancer health risks, ATSDR did assume that workers were exposed to maximum detected levels, 8 hours per day, 40 hours per week, for 20 years, because there was no information in the data provided to ATSDR on how long workers may have been exposed to a particular contaminant during a particular work day or work week at SCC. However, all of the contaminants that ATSDR evaluated in the Exposures to Former Stauffer Workers section of the PHA, except for arsenic and sulfur dioxide, exceeded either the current or former OSHA time-weighted average (TWA). The TWA is the allowable time-weighted average concentration for a normal 8-hour workday or 40-hour work week. While exposures above the TWA might not necessarily indicate adverse health effects would occur, continual or repeated exposures above the TWA definitely increase a worker's risk for adverse health effects. In evaluating theoretical cancer risk ATSDR assumed that workers were exposed to maximum detected levels, 8 hours per week, 50 weeks per year, for 20 years. (When insufficient environmental data exist to estimate an average concentration, as is the case with Stauffer's environmental data on worker exposure, it is prudent public health practice to use the maximum concentration). ATSDR has received and reviewed the information that was provided on the length of employment for Stauffer workers. It is true based on this information that 76% of SCC workers were employed at the plant for less than 1 year; however, that same data indicates that 25–26% worked longer than 1 year. This data also indicates that 2–3% of the SCC work force worked 20 years or more. Even though only a small percentage of workers worked at SCC long term, it is generally ATSDR's policy to be conservative by looking at both the "worst case" and "most likely" exposure scenarios. Given this new information, ATSDR could have used 30 years instead of 20 years for its most conservative length of exposure estimate because it appears that some workers did stay at the plant for 30 years or more. However, in light of this additional information, ATSDR does agree that the majority of SCC workers were employed at the plant for less than 1 year, and that these workers would not be as likely as those who worked at the plant for many years to have or develop adverse health effects.

Comment #28: ATSDR agrees that respirator use is an important determinant of exposure but assumed none were used at the plant based on a claimed absence of information concerning the use of such equipment. (PHA at page 124.) In fact, the Hoyte opinion and underlying record contain substantial information about the use of personal protective equipment: respirators were in use at the plant from the early 1950s, and a formal written respiratory protection program was in place no later than 1964.

ATSDR Response: Even though SCC states that they had a written respiratory protection program beginning in 1964, other documents suggest that the program was not well established until much later. SCC inter-office correspondence from as late as the early 1970s indicates that employees were not actually wearing respiratory protection while performing tasks where they were being exposed to dust and other contaminants in excess of OSHA standards. Inter-office correspondence dated June 13, 1972, indicates "In no case was any Stauffer employee seen to be using a respirator, although dust levels were extremely high even for momentary exposure." This information along with testimony of former employees leads ATSDR to conclude that the use of respiratory protection by SCC employees was intermittent at best prior to the early or mid-1970s.

Comment #29: ATSDR uses maximum detected levels as the uniform exposure level for all workers. The detailed sampling information, however, makes it clear that maximum concentrations were not representative of exposure conditions. To the contrary, the overwhelming majority of the personal sampling results were below all health-based regulatory standards.

ATSDR Response: ATSDR used the maximum detected level for each of the contaminants in its evaluation rather than the average level because of the limited data available. ATSDR believes that the maximum sample concentrations are more representative of actual worker exposures than average levels, based on the data and information reviewed for this PHA.

Comment #30: The worker discussion contains a number of internal inconsistencies. Arsenic exposures, for example, are said in the Executive Summary (PHA at page 12) to present an increased cancer risk to workers. The Conclusions chapter, on the other hand, lists no such conclusion (PHA at page 149), and the discussion of public health implications in Chapter 5 of the PHA affirmatively states that arsenic exposures are "unlikely" to have caused any adverse health effects, "including cancer," for Stauffer workers (PHA at page 114). Similarly, the Executive Summary section and the Conclusions chapter both report nickel exposures as presenting an increased risk of cancer; the discussion of public health implications in Chapter 5, however, sets forth no such conclusion and instead notes that the maximum detected level is below the cancer effect level for occupationally exposed populations. Other similar inconsistencies exist.

ATSDR Response: ATSDR has corrected these inconsistencies in the PHA.

Comment #31: The PHA contains a near-encyclopedic listing of health effects potentially associated with each compound, whether acute or chronic and involving exposure scenarios not plausibly relevant (e.g., asphyxiation with hydrogen sulfide). The Stauffer plant ceased

operations in 1981, and so any worker exposures occurred between 22 and 56 years ago. Under the circumstances, the only health risks of any potential current relevance are those associated with chronic or latent health effects. It makes no sense to discuss acute health effects or risks of compounds (such as phosphorus) that present no risk of latent disease or for which any latency period has long since passed. Similarly, detailed discussion of health effects that are judged unlikely (such as asbestosis) is counterproductive and confusing in a risk communication document.

ATSDR Response: It is true that current potential health risks are those associated with chronic or latent effects; however, ATSDR included some discussion of acute effects in the appropriate sections of the document, based on an interest in both acute and chronic effects by former SCC employees.

Comment #32: The PHA fails to take any account of the Checkoway studies, which evaluated mortality in a massive cohort of workers in the Florida phosphate industry (including the Stauffer plant) for 43 years and found no pattern of significant disease risk for the workers or any subset of the cohort. These findings are consistent with the results of the "cause of death" project undertaken by the University of South Florida and FDOH (PHA at pages 122-23, 149). The results of these three studies are important to assessing worker health risk. ATSDR's announced intention of conducting a workshop to discuss the health screening/medical evaluation of former Stauffer workers is inconsistent with both the results of these studies and ATSDR's conclusion that a health study of this population is not feasible.

ATSDR Response:

1. ATSDR considered the research findings of Dr. Checkoway et al. in its health risk evaluation, and referenced this paper in the PHA. For finalizing the PHA, additional recently acquired, relevant mortality and morbidity studies will be considered and referenced.

2. SMC refers to the USF/ FL DOH cause of death information package as a study. It is not a study, but rather a frequency table of cause of death for select former workers. We agree that these data are important to consider and will do so for the purpose of finalizing the PHA report; however, the data are not complete, and ATSDR is attempting to collect additional cause of death data.

3. The SMC comments regarding the inconsistency of conducting an expert workshop were addressed previously (see ATSDR Response to Comment #4).

Comment #33: In its section on exposures to former workers, the PHA considers the use of asbestos, arsenic, carbon monoxide, hydrogen sulfide, lead, nickel, phosphorus (including phosphine and phosphoric acid), sulfur dioxide, total dust, quartz, and silica, and total chromium. It concludes that former workers are at an increased "theoretical risk" of lung cancer from intermittent exposure to asbestos and that former workers are at an increased "theoretical risk" of lung and/or nasal cancer from intermittent exposure to nickel and chromium (PHA at page 125). It also concludes that workers were intermittently exposed to carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorus compounds,

sulfur dioxide, total dust, quartz, and silica at levels that can cause adverse health effects (PHA at page 125). As a result of these conclusions, the PHA states that the ATSDR will explore the "appropriateness and feasibility of conducting health screening/medical evaluation of former workers" by convening a meeting of "medical and epidemiological experts" to provide guidance and recommendations for potential health screening (PHA at 126).

ATSDR Response: ATSDR convened an Expert Panel on July 31, 2003, to discuss many topics, including the uncertainties regarding possible adverse health effects posed by these past exposures and the types of public health follow-up activities that might be appropriate for former workers.

Comment #34: Notably absent from the discussion of potential health effects to plant workers, however, is any mention of the cohort mortality study of 23,000 workers in the Florida phosphate industry conducted by Dr. Harvey Checkoway, a world-renowned epidemiologist and professor, now at the University of Washington. His study was initially reported in 1986 in the Journal of Occupational Medicine, and in 1996 he published a second study adding fourteen years of follow-up data on the cohort in the American Journal of Industrial Medicine. One of the facilities included in Dr. Checkoway's study was the Stauffer elemental phosphorous plant.

Dr. Checkoway's cohort mortality studies of the Florida phosphate workers included all of the sampling data from the Stauffer plant as well as other industry sampling data obtained from OSHA, NIOSH, and the Florida Department of Health. Dr. Checkoway looked at the workers based upon their different potential exposures and job categories and specifically examined whether potential exposures to various substances common in the industry could result in any significant disease risk in any job category.

Dr. Checkoway concluded: (1) there was no excess disease risk to workers in any job category from exposure while working in the Florida phosphate industry; (2) there was no excess disease risk to workers in any job category from exposure to silica while working in the Florida phosphate industry; (3) mortality rates from lung cancer and other diseases were not remarkably excessive in workers employed in the Florida phosphate industry; and (4) important associations between exposures and excess disease risk were not likely missed or underestimated due to the size of the cohort in the studies. In short, Dr. Checkoway found no pattern of significant disease risk in the Florida phosphate workers.

Dr. Checkoway's conclusions are consistent with the findings from the "cause of death" study of former Stauffer workers done by the University of South Florida and FDOH, and both are inconsistent with the extremely conservative and highly theoretical risks calculated by ATSDR. Indeed the Conclusions chapter reports that "[c]ause of death data . . . did not indicate an elevated number of deaths due [to] lung disease consistent with Stauffer site contaminants." (PHA at page 149.) The ATSDR should reevaluate its conclusions in light of both that observation and Dr. Checkoway's cohort mortality studies and adjust its recommendations accordingly. At the very least, the Checkoway study

should be prominently discussed and its conclusions, along with the cause of death findings, set forth in the Executive Summary.

ATSDR Response: The Checkoway study was considered in assessing health risks for former workers. The results of the Checkoway study, along with other recently acquired relevant research information, will be used in finalizing the PHA. Some of this research will be elaborated in the final PHA's Discussion section. However, ATSDR does not feel that it would be appropriate to include the Checkoway study results or the cause of death frequency counts for former Stauffer workers in the PHA's Executive Summary.

Comment #35: The PHA Uses Assumptions Not Supported by the Data or the Manner in which the Plant Operated and Ignores Available Information Regarding Plant Operations.

In evaluating worker exposures and the possibility of associated harmful health effects, the ATSDR used the single highest measured level for any substance (without regard for the frequency of the measurement), assumed "a worst case scenario" that workers were constantly exposed to that level 8 hours per day, 40 hours per week, for up to 20 years, and then compared that level to comparison values based on 24 hour-per-day exposures (PHA at pages 123-4). This methodology is extremely conservative and cannot be justified, as ATSDR attempts to do by reference to various items of information it lacks. The fact is far more information is available than ATSDR admits, and the assumptions it has made where the data is imperfect unjustifiably overstate the exposure risks. We address the "uncertainties and limitations" identified by ATSDR (PHA at page 123) to justify its methodology in more detail below.

1. Lack of Data from 1947-1970 -- The PHA states, "Arguably, the biggest limitation is the lack of exposure information for the period 1947 to 1970 -- almost 25 years of Stauffer operations." (PHA at page 123.) While it is true that exposure data does not exist for that period, it is difficult to discern why that should limit ATSDR's ability to make use of data that does exist and make reasonable assumptions. Moreover, any exposures occurring prior to 1971 are at least 32 years old and are likely to have much less potential for current health impact than the 22 to 32 year old exposures from the 1971-1981 period, for which industrial hygiene data is available.

2. Evaluation Based on Maximum Level Detected -- The PHA states, "ATSDR based its evaluation of estimated exposure on the maximum level detected . . . ATSDR used the maximum concentration rather than average concentration in its calculations because of limited data from Stauffer." (PHA at page 123.) In fact, there is a great deal of industrial hygiene data available, including hundreds of samples described in more detail below. A review of this mass of data reveals not only that the overwhelming majority of exposures were in compliance with the occupational exposure standards in place at the time the samples were taken, but also that they would have been in compliance with the standards in effect today. In this regard it bears note, as the Hoyte court found, that in its entire operating history, Stauffer received only one OSHA citation for exceedance of any occupational exposure limit – and that single citation has been recognized as unrepresentative because the exceedance resulted from the fact that a newly installed piece

of air quality equipment was in the process of being installed and not yet fully functional when the sample was taken. Instead of blindly selecting the sample with the highest recorded measurement (and ignoring pertinent contextual information about the reliability and relevance of these samples), ATSDR should have evaluated the dataset for each compound as a whole. Such an evaluation would lead one to conclude that most samples document that exposures were well within relevant occupational levels, both now and at the time samples were taken.

3. Assumption of 20-Year Exposures -- The PHA "assumed that some workers were exposed to these levels for up to 20 years." (PHA at page 123.) ATSDR had access to the actual plant employee tenure records, but apparently chose not to make use of them. Had the ATSDR decided to use the available data, it would have discovered that the number of workers exposed for a period of 20 or more years is very limited. The court in Hoyte found that approximately 76% of the workers were employed at the Plant less than one year and almost 60% were there less than three months." According to employment records available in the Hoyte record, only 59 of 2511 employees (2.3%) worked at the plant for more than twenty years, and as discussed below, it is unlikely that exposure to such individuals would have been constant in that period. The ATSDR's assumption that all workers were employed for 20 years, when in reality only 59 were and the overwhelming majority of employed only for a matter of months, dramatically skews any assessment of increased risk to the point where ATSDR's assessment is meaningless.

4. Assumption of 40-Hour/Week Exposures -- The PHA states "ATSDR has no information to determine the length of worker exposures at Stauffer. ATSDR assumed a worst case scenario: that workers were exposed to the maximum contaminant for 8 hours per day, 40 hours per week." (PHA at 123.) However, even ATSDR acknowledges that a "more reasonable assumption is that a worker might perform a particular task (i.e., cutting asbestos gaskets) once or twice per week for 20-30 minutes at a time." (PHA at 123-4.) In fact, information is available that documents that ATSDR's assumption is wildly unrealistic. First, we have actual personal sampling data that shows there were no constant exposures at these levels; indeed, the overwhelming majority of measured levels were below applicable occupational health standards. Second, evidence from the Hoyte case showed exposures to many compounds were limited and sporadic. It is unreasonable for the ATSDR to use a worst-case scenario when information is available regarding actual exposure durations.

5. Assumption of No Respiratory Protection -- The PHA states that "ATSDR has very little information on the use of respiratory protection or other personal protective equipment at Stauffer. As a worst case scenario, ATSDR assumed that no respiratory protection ... was worn by workers." (PHA at page 124.) The assumption that no respiratory equipment was used is belied by the available evidence that some forms of respiratory protection were used early in the plant's history, and that beginning by the early 1960s, formalized plant and company respiratory protection plans were in place. Use of respiratory protection is also noted in many of the industrial hygiene reports that discussed testing of employees for exposure. Under the circumstances, ATSDR's

assumption that no respiratory protection was in use at the plant is unrealistic and overstates any potential health risks from plant operations.

6. Use of ATSDR CVs -- ATSDR used its CVs, which are based on 24 hour per day exposures and were not meant to be used in assessing occupational exposures, to determine whether adverse health effects in former workers at Stauffer might have resulted from exposure to contaminants. Although the PHA notes that fact and suggests therefore that the results should be treated with caution (PHA at page 124), such qualifying language is not nearly strong enough. The CVs are patently inapplicable to this circumstance. ATSDR should refer instead to occupational exposure limits that are designed specifically for the express purpose of minimizing risk in the work setting.

ATSDR Response:
1. Lack of Data from 1947–1970 – ATSDR acknowledges in the Uncertainties and Limitations section of the document that the data provided was limited. ATSDR has used the data, correspondence, and transcripts provided to make the best quantitative and qualitative assessment possible.

2. Evaluation Based on Maximum Level Detected – As stated previously, ATSDR used the maximum detected level for each of the contaminants in its evaluation rather than the average level because of the limited data available. ATSDR believes that the maximum sample concentrations are more representative of actual worker exposures than average levels, based on the qualitative and quantitative data and information reviewed for this PHA.

3. Assumption of 20 year Exposure – In the discussion about risk to workers, ATSDR pointed out that some workers were exposed for 20 years and this statement is true for a limited number of workers. In evaluating theoretical cancer risk ATSDR assumed that some workers were exposed to maximum detected levels, 8 hours per week, 50 weeks per year, for 20 years. As mentioned previously, when data are limited, it is prudent public health practice to use the maximum level to estimate risk. ATSDR has received and reviewed the information that was provided on the length of employment for Stauffer workers. It is true that based on this information 76% of SCC workers were employed at the plant for less than 1 year; however that same data indicates that 25–26% worked longer than 1 year. ATSDR believes that its 20-year exposure assumption is applicable to some former employees.

4. Assumption of 40-Hour/Week Exposures – ATSDR addressed this issue in response to a previous SMC comment (see ATSDR Response to Comment #27).

5. Assumption of No Respiratory Protection – ATSDR addressed this issue in response to a previous SMC comment (see ATSDR Response to Comment #28).

6. Use of ATSDR CVs – ATSDR used both occupational standards and its comparison values (CVs) in assessing occupational exposures to former SCC workers. ATSDR CVs are generally used as a screening tool during the public health assessment process. Substances found in amounts greater than their CVs are generally evaluated further in the PHA. ATSDR selected 18 substances for further evaluation from the data provided (Table 57). All of these substances had

an occupational standard, while only 10 had an ATSDR CV. In evaluating exposure of former SCC workers to workplace substances, ATSDR used the occupational standards as its primary decision-making tool and used CVs as a secondary tool. ATSDR clearly states the limitations of using the CVs in its evaluation in the PHA and feels the language is sufficient. In addition, there were only three substances (out of the 18) where the occupational standard was not exceeded, but the ATSDR CV was exceeded. One of those substances (arsenic) was determined unlikely to cause adverse health effects in former workers. The maximum concentrations of the other two substances, sulfur dioxide and chromium, were just below their occupational standards (sulfur dioxide - 0.61ppm and chromium - 0.04 mg/m^3 below their respective occupational standards).

The Increased Health Risks Identified in the PHA Lack Credible Scientific Support.

<u>Comment #36:</u> The available evidence does not support the PHA's conclusion that former workers at Stauffer were exposed to asbestos at levels indicating an increased risk of lung cancer.

The PHA concluded that: "Former workers at Stauffer were intermittently exposed to asbestos or ACM at levels that indicate an increased theoretical risk of lung cancer, but it is unlikely (based on air monitoring data) that workers are at risk for asbestosis." (PHA at page 12.) A review of sampling data does not provide a sufficient scientific basis for concluding that workers were intermittently exposed to asbestos at levels that indicate an increased risk of contracting lung cancer. Of thirteen asbestos samples taken, only one -- an area sample -- measured above 0.1 f/cc, which is the current PEL for worker exposure. The six personal samples are the only samples that are representative of worker exposure, and all of these personal samples had concentrations below the current PEL (0.035, 0.01, 0.037, ND, ND, and ND f/cc). Indeed, if the plant were currently in operation, OSHA would not mandate health screening for workers based on these samples.

None of the seven area samples taken at the plant are representative of worker exposures. If ATSDR insists on considering them, it should begin by noting that five of the area samples detected no asbestos fibers. One measured only 0.04 f/cc. The other area sample -- the one that the PHA cites as exceeding the current PEL (PHA at page 113) -- was a six-minute area sample taken in the storeroom while asbestos was being removed from storage. Importantly, the sampling reports indicate that the maximum area sample was taken simultaneously with a personal sample, which recorded an exposure level of 0.01 f/cc, and which is a more representative measurement of worker exposure during those six minutes than the area sample. The area sample should be completely discounted when evaluating worker exposure in favor of the more representative personal sample.

In its reliance on one area sample to demonstrate asbestos exposure risks, the PHA also fails to note that only a limited number of plant workers would have had potential exposures to the levels of asbestos measured in the highest area sample it cites. The only sample that exceeded the current PEL was measured in the storage room where asbestos containing materials were kept. This room was isolated from the remainder of the plant storeroom. The workers entering that room were furnace department employees who wore respirators while the asbestos containing materials were being removed, as was the case

when the area sample was taken. Employees who did not work in the furnace department would not have come into contact with asbestos at any levels of potential concern.

The available measurements provide no basis for the conclusion that workers were exposed to asbestos at levels that increased their risk of lung cancer. ATSDR should, therefore, withdraw its conclusion, based on those measurements, that the Stauffer workers were exposed to asbestos at levels indicating an increased risk of lung cancer.

ATSDR Response: ATSDR acknowledges the additional information provided by SMC regarding asbestos sampling results and the limitations of the sampling data (mainly only 13 personal or area samples for asbestos taken between 1975 and 1976). However, ATSDR was asked to evaluate worker exposures to asbestos for the 34 years of SCC operations based on samples taken near the end of the time that SCC was in operation. ATSDR based its assessment on both quantitative and qualitative input (documentation and statements from SMC and former workers) and believes that the maximum sample value is more representative of former worker asbestos exposures at SCC than the average values or frequency. ATSDR agrees that if there is sufficient data it is better to use personal sampling results rather than area sampling results, but in this case the data are so limited that, to be conservative, ATSDR chose to use the maximum concentration from the area sample. ATSDR also agrees that not all employees were at risk for asbestos exposure. The highest risk of exposure was for workers who worked in the storeroom, furnace department, or kiln department. As indicated earlier in this response, ATSDR also considered some qualitative information in its decision to use the maximum concentration in evaluating former worker exposure to asbestos, which included correspondence indicating the lack of use of respirators at SCC several times during the early 1970s, and the fact that the facility was cited for improper handling and storage of asbestos in 1975. In addition, ATSDR also considered testimony from former workers describing conditions at the facility prior to 1975 and 1976 (i.e., before the asbestos samples were taken).

Comment #37: The evidence does not support the PHA's conclusion that former workers at Stauffer were exposed to arsenic, nickel and chromium at levels indicating an increased risk of lung and/or nasal cancer.

The PHA concluded that: "Former workers at Stauffer were intermittently exposed to arsenic, nickel and chromium at levels that indicate an increased theoretical risk of lung and/or nasal cancer." (PHA at page 12.) Each of the specific substances identified by ATSDR is discussed below.

Arsenic -- In the Executive Summary, the PHA states that former workers were intermittently exposed to arsenic at levels that indicate a theoretical risk of cancer. (PHA at page 12.) However, later in the text of the PHA, the ATSDR concludes that "Based on ATSDR's evaluation it appears unlikely that adverse health effects, including cancer, would occur as a result of any arsenic exposures related to Stauffer." (PHA at page 114.) In light of this conclusion, the Executive Summary should be changed to reflect ATSDR's conclusion that former workers are not at increased risk of cancer (or any other health effect) due to exposure to arsenic.

Nickel -- A review of plant records and sampling data likewise provides no basis for concluding that workers were intermittently exposed to nickel or chromium at levels that indicate an increased theoretical risk of lung cancer and/or nasal cancer. The nickel sampling done in 1981 consisted of personal samples of mechanics engaged in stainless steel welding operations. Very few employees ever engaged in welding at the plant. Those who did only welded occasionally, as they were also assigned numerous other duties. Nickel exposure was never a concern for non-welders.

Only two of eight samples for nickel exceeded the current ACGIH TLV of 0.10 mg/m3. They had concentrations 0.26 and 0.16 mg/m3 respectively, and these exceedances do not take into account the fact that welding was not done for 8 hours a day and that the welders wore respiratory protection where the samples were taken. The highest sample was taken when the portable fan, typically used to enhance ventilation during welding, was unavailable. Further, the OSHA PEL for nickel is 1 mg/m3, so all of the sample results are less than this limit. The other samples, measuring 0.01, 0.02, 0.01, ND <0.01, 0.08, and ND <0.01 mg/m3 respectively, show that under normal welding conditions exposure to nickel was below both the TLV and the PEL. Selective use of the maximum measured exposure thus provides an inflated assessment of the workers' true level of exposure. In fact, the PHA itself states notes that none of the samples exceed the Cancer Effects Level of 10 mg/m3 established for an occupationally exposed population (in fact, the maximum sample measured only 2.6% of the Cancer Effects Level) (PHA at page 117). Based on this information, the ATSDR should withdraw its conclusion that workers were exposed to nickel at levels indicating an increased risk of lung and/or nasal cancer.

Chromium -- Chromium was likewise only a potential concern for mechanics engaged in welding. As with nickel, this was an intermittent exposure that occurred during infrequent welding operations by some mechanics and is not representative of daily exposures. The measured exposures ranged from 0.01 to 0.46 mg/m3. Again, the highest sample was one taken when the normally used ventilation was not available. The ATSDR used a TLV of 0.01 mg/m3, which likely is a reference to the TLV for insoluble chromium VI compounds. The samples referenced were of total chromium, not chromium VI, and ATSDR had suggested no basis to presume that the entirety of the chromium measurement was made up of chromium VI. In these circumstances, ATSDR's comparison of total chromium concentrations to standards for chromium VI is totally inappropriate. Total chromium sample results should be compared to the standards for total chromium: the TLV is 0.5 mg/m3 and the PEL is 1 mg/m3. All samples were below both of these exposure limits, and most were significantly below. This evidence does not support an assertion of serious health hazards for mechanics, much less other employees. Based on this information, the ATSDR should withdraw its conclusion that workers were exposed to chromium at levels indicating even a theoretical increased risk of lung and/or nasal cancer.

ATSDR Response:
Arsenic - ATSDR removed arsenic from the text of the Executive Summary on page 12. It was inadvertently left in the text after previous changes to the document. To reiterate, ATSDR found it unlikely that adverse health effects would occur as a result of arsenic exposure at SCC.

Nickel – ATSDR acknowledges the limitations of the sampling data for nickel (mainly eight samples taken in 1981 with no previous sampling data). As previously stated, ATSDR used conservative assumptions in evaluating past exposure at SCC. ATSDR acknowledges that welders would have been the most likely SCC employees to have nickel exposure. ATSDR has no way of determining how often ventilation was unavailable or whether employees were wearing respiratory protection during welding operations as the SMC claims. ATSDR stands behind its conclusion that repeated exposures—without respiratory protection—to nickel at the levels found at SCC could potentially cause adverse health effects in exposed workers (welders).

Chromium – ATSDR acknowledges the limitations of the sampling data (mainly eight samples for chromium taken in 1981 with no previous data). In addition, ATSDR acknowledges that because the chromium samples were not speciated, it is difficult to estimate the concentration of chromium VI versus chromium III. As requested by SMC, ATSDR will compare the sample results to the standard for total chromium and make the appropriate changes in the text and tables of the PHA. However, to be conservative, ATSDR will continue to consider that all of the chromium in the sample was chromium VI. This will not change ATSDR's conclusion regarding chromium in the PHA—the level of total chromium from the sampling data is more than 100 times higher than the LOAEL in ATSDR's Toxicological Profile for chromium VI. As indicated in the PHA, this LOAEL was based on a study of chrome-platers exposed to chromium VI compound, via inhalation, for an average of 5.3 years that affected renal function. If former SCC workers were exposed, without proper ventilation or respiratory protection, to chromium levels similar to the chromium levels in the study, they might have experienced adverse health effects similar to those that were experienced by workers in the study.

<u>Comment #38:</u> The evidence does not support the PHA's conclusion that former workers at Stauffer were exposed to carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorus compounds, sulfur dioxide, total dust, quartz, and silica at levels that can cause adverse health effects.

The PHA concluded that: "Former workers at Stauffer were intermittently exposed to carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorus compounds, sulfur dioxide, total dust, quartz, and silica at levels that can cause adverse health effects." (PHA at page 12.) A review of plant records and sampling data provides no basis for concluding that workers were intermittently exposed to carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorus compounds, sulfur dioxide, total dust, quartz, and silica at levels that can cause adverse health effects. Indeed, most of the samples taken were in compliance with OSHA standards, as they existed then and today. Each of the specific substances identified by the ATSDR is discussed below.

Carbon Monoxide -- The PHA identifies a maximum grab sample of 700 ppm and concludes that because that sample exceeds the current TLV, former workers are at an increased risk of adverse health effects (PHA at pages 113-14). What the PHA does not mention is that the carbon monoxide samples were taken for the purpose of confined space entry on the furnace rotoclone collector. Before a worker was allowed into the space to perform maintenance on the equipment, a sample was taken to determine whether it was safe to enter. The sample cited by the ATSDR resulted in a denial of entry for the worker,

and thus there was no exposure at that level. Moreover, exposure to carbon monoxide was not generally a health concern for workers at the plant; the only sampling data showing any potential for carbon monoxide levels to exceed the current TLV was in this seldom-accessed, confined space.

Finally, carbon monoxide does not present any latent health issues. Concern for health effects from acute exposure to carbon monoxide is no longer present 22 years after the closure of the plant. Based on this information, the ATSDR should not have identified carbon monoxide as presenting a health risk for former workers.

Chromium -- As discussed above, only mechanics who welded stainless steel were potentially exposed to chromium, and they were exposed at levels below the exposure limit for total chromium. The measured exposures ranged from 0.01 to 0.46 mg/m3. The ATSDR's use of a TLV of 0.01 mg/m3 for chromium VI is inappropriate as the samples referenced were of total chromium, not chromium VI. The appropriate TLV would be 0.5 mg/m3. No sample exceeded that limit. The evidence does not support an assertion that health hazards exist for mechanics, much less other employees who would not have been exposed to chromium.
There is no evidence to indicate that any workers ingested chromium, so the health effects described in the PHA related to ingestion (PHA at page 122) would not be expected in the worker population. Nor were workers handling products containing chromium, as the only chromium exposure was during the welding of stainless steel; as such, the risk of skin ulcers identified by the PHA would not be an expected health concern for the Tarpon Springs workers. Moreover, none of the non-cancerous effects of chromium are latent health concerns. Based on this information, the ATSDR should not have identified chromium as presenting a health risk for former workers.

Hydrogen Sulfide -- The PHA identifies one grab sample out of three total samples taken in 1978 and, because it exceeded the 8 hour TWA TLV and the ACGIH STEL, concludes that former workers are at an increased risk of adverse health effects (PHA at 115-16). In fact, the grab samples referenced by the ATSDR were all from the inside of a P4 tank car. The testing was done to determine whether the tank car was safe for worker entry. Following each of the three grab samples referenced by the ATSDR, the worker was denied entry. Thus, there is no evidence that any worker was ever exposed at the levels referenced by ATSDR.

It should be obvious that asphyxiation is not a current risk for former workers, so discussion of that effect does not serve any useful purpose. In fact, hydrogen sulfide does not present any latent health issues, which are the only issues of concern now, 22 years after the closure of the plant. Based on this information, the ATSDR should not have identified hydrogen sulfide as presenting a health risk for former workers.

Lead -- The ATSDR references four lead samples taken during a survey of spray painting operations in 1981. (PHA at 116.) Contemporaneous plant records document that this survey was not intended to be representative of workplace conditions; to the contrary, it was designed to evaluate a worst-case scenario lead exposure – in fact, it took nine months

before the conditions presented themselves to allow a full-shift survey. The plant employed two full-time painters. The lead measurements were not representative of worker exposure since they occurred during spray painting operations that were infrequent. The painters were provided with respirators while spray painting, and spray painting was mainly done outdoors. More commonly, painting was done by brush, which did not raise the same potential concerns regarding exposure to lead.

The sampling referenced in this survey thus does not provide evidence for a pattern of overexposure for this group of workers or any other group at the plant. The evidence suggests that the combination of administrative controls (most paint was applied by brushes), job rotation (painters did not paint all the time), and personal protective equipment (painters had respirators available during spraying) almost certainly kept exposure levels below any occupational exposure standards. And in any case, as the Hoyte Court found former painters are not at present risk for any latent disease caused by exposure to lead, no matter what the level, because the latency period for any conceivable lead-related health effects has passed. Based on this information, the ATSDR should not have identified lead as presenting a health risk for former workers.

Nickel -- As discussed above, only welding mechanics were exposed to nickel, and the measured levels of exposure during welding operations do not indicate that workers were at any risk of adverse health effects. None of the samples exceeded the PEL of 1 mg/m3, and only two of eight personal samples exceeded the current TWA of 0.10 mg/m3. They measured 0.26 and 0.16 mg/m3 respectively, and these exceedances do not take into account the facts that welding was done on average for only 5 hours per shift, individual mechanics did not weld on a daily basis and had many other job responsibilities, the welders wore respiratory protection when the samples were taken, and the highest sample was measured on an atypical occasion when the portable fan was not being used. The other samples, ranging from ND to 0.08 mg/m3, show that under normal welding conditions, exposure to nickel was below the TWA. Moreover, the most common adverse health effect identified by the ATSDR is allergic reaction. Based on this information, the ATSDR should not have identified nickel as presenting a health risk for former workers.

Phosphorus Compounds -- Plant records show that only 5 of 102 personal samples for yellow phosphorous measured at levels above the TLV for occupational exposure of 0.1 mg/m3. Measurements for phosphorus pentoxide and phosphoric acid (P2O5/H3PO4) showed that 20 of 53 samples exceeded the TLV of 1 mg/m3. The TLV documentation does not discuss chronic or latent diseases associated with prior exposure to concentrations at or above the TLV. The basis for the TLV is to limit exposures to concentrations below that causing "throat irritation among unacclimated workers and well below that which is well tolerated by acclimated workers." The Documentation notes that concentrations up to 11.3 mg/m3 caused coughing among the inexperienced but could be tolerated. The maximum observed concentration, 4.06 mg/m3, is less than half the 11.3 mg/m3 recognized as tolerable for acclimated workers. These measurements do not support the assertion that a health hazard exists.

The sampling for phosphine, like sampling for hydrogen sulfide discussed above, was testing done prior to worker entry into the P4 tank car. The workers were not allowed to enter the car at the phosphine concentrations cited by ATSDR.

ATSDR's use of maximum sample results (PHA at page 123) distorts the true level of exposure to phosphorus and related compounds at the plant. Phosphorus, phosphine, or phosphoric acid exposure do not present latent health concerns. Since the plant closed 22 years ago, health effects from acute exposures to phosphorus gases are no longer a concern. Based on this information, the ATSDR should not have identified phosphorus compounds as presenting a health risk for former workers.

Sulfur Dioxide -- The PHA acknowledges that the maximum measured concentration of sulfur dioxide did not exceed the occupational standard – in other words, not one of 59 personal samples for sulfur dioxide exceeded any occupational standard. (PHA at Table 57.) Instead, the PHA references the ATSDR CV of 10 ppb and finds a health risk based on the fact that the highest measured level was 1.39 ppm. This analysis is flawed for at least two fundamental reasons. First, there is no basis to conclude that level was representative of worker exposures; in fact of 47 personal samples taken, all but three were non-detects. Second, and most importantly, exposure to 1.39 ppm (1,390 ppb) should not result in any long-term health effects. The health impacts of exposure to SO2 are reviewed in detail in Section II of these comments. As the PHA observes, chronic health effects have been observed in guinea pigs exposed to 5.7 ppm SO2 for 22 hours a day, 7 days a week for 52 weeks. However, as noted by ATSDR, the "former Stauffer workers are not likely to have experienced these same effects because they were not exposed to sulfur dioxide at the levels or frequencies experienced by the animals in this study" (PHA at page 119). Thus ATSDR's conclusion that former Stauffer workers were intermittently exposed to SO2 at levels that can cause adverse health effects, is not supported by their own analysis. Based on this information, the ATSDR should not have identified sulfur dioxide as presenting a health risk for former workers.

Total Dust, Quartz, and Silica -- The PHA's conclusion that dust levels presented a health risk cannot be reconciled with the fact that the overwhelming majority of dust exposures were well below even present day occupational standards. All of the 55 samples for respirable quartz and silica were within the present PEL even assuming that the samples were 100% SiO2 (and using the formula PEL = 10 mg/m3 /(%SiO2 + 2)). Moreover, testing for respirable dust showed that 55 of 56 respirable dust samples were within the current PEL of 5 mg/m3. Overall, only about eight percent of the samples actually exceeded the current PELs for the substances tested. These results demonstrate that ATSDR's reference to the maximum sample results drastically distorts the interpretation of the data.

The scientific consensus is that silica-related diseases are a function of cumulative exposures. The typically short tenure of the workforce at the Stauffer plant coupled with the generally low sampling results, indicates that there is no credible risk of silica-related disease for this population. Based on this information, the ATSDR should not have identified total dust, quartz, and silica as presenting a health risk for former workers.

ATSDR Response: ATSDR acknowledges the additional information provided by SMC regarding the maximum concentrations in the data for carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorous compounds, sulfur dioxide, total dust, quartz, and silica. ATSDR has noted in the discussion that the maximum concentrations for carbon monoxide, hydrogen sulfide, and phosphine may not be representative of actual worker exposure because the sample was taken in a confined space. As discussed in responses to previous SMC comments, ATSDR chose to include information regarding both acute and chronic health effects for some contaminants based on concerns from former workers at the SCC facility. ATSDR would like to reiterate that its conclusion for these contaminants (carbon monoxide, chromium, hydrogen sulfide, lead, nickel, phosphorous compounds, sulfur dioxide, total dust, quartz, and silica) was that they were found in the sampling data at levels that can (not did) cause adverse health effects, and ATSDR stands behind this conclusion**.** As previously indicated, ATSDR believes that the maximum sample values are more representative of former worker exposures at SCC than the average values based on both quantitative and qualitative input from SMC and former workers. Sixteen (16) out of the eighteen (18) contaminants selected by ATSDR for review exceeded a current or former occupational standard.

Comment #39: ATSDR's Recommendation of an Expert Workshop to Plan Medical Screening for Former Workers is Confusing, Contrary to ATSDR Guidelines and Good Science, and is Ill-formed.

The PHA's ultimate conclusion, following its assessment of potential worker exposures, is to schedule a workshop of experts to receive "input for planning health/medical screening for Stauffer former workers." (PHA at page 149.) Candidly, the description of this intended workshop is so short that its purpose is obscure, but it appears to rest on at least a preliminary conclusion that some form of medical screening activity is warranted based on the exposure assessment set forth in the PHA. To begin with, of course, SMC strongly disagrees with the exposure assessment, which is scientifically and factually indefensible for reasons detailed above. As importantly, though, the recommendation – which follows immediately on the PHA's conclusion that it is not feasible to conduct a health study to determine whether any increased incidence of disease exists in the former worker population – is contrary to ATSDR's guidelines for medical monitoring and scientifically unsound. Under the circumstances, the recommendation can serve no legitimate, science-based public health interest.

ATSDR has promulgated the Final Criteria for Determining the Appropriateness of Medical Monitoring Under CERCLA, which should govern its efforts here. These regulations set forth seven criteria that must be met for a medical monitoring program to proceed. The criteria are:

(1) There should be evidence of contaminant levels in the environmental media that would suggest the high likelihood of environmental exposures to a hazardous substance and subsequent adverse health outcomes.
(2) There should be a well-defined, identifiable target population of concern in which exposure to a hazardous substance at a sufficient level has occurred.

(3) There should be documented human health research that demonstrates a scientific basis for a reasonable association between an exposure to a hazardous substance and a specific adverse health effect (such as an illness or change in a biological marker of effect).
(4) The monitoring should be directed at detecting adverse health effects that are consistent with the existing body of knowledge and amenable to prevention or intervention measures.
(5) General requirements for a medical screening program should be satisfied.
(6) An accepted treatment, intervention, or both, for the condition (outcome or marker of exposure) must exist and a referral system should be in place prior to the initiation of medical monitoring program.
(7) The logistics of the system must be resolved before the program can be initiated.

There is no circumstance in which the seven criteria can be satisfied in this case, without ignoring the regulations that require the ATSDR to utilize the best available science.

1. There is no evidence of contaminant levels in the environmental media that would suggest the high likelihood of environmental exposures to a hazardous substance and subsequent adverse health outcomes. -- As an initial matter, the ATSDR must demonstrate evidence of contamination that suggest the high likelihood of adverse health outcomes. The PHA talks only about "theoretical risk" for cancer outcomes, and the possibility of occurrence of non-cancerous outcomes. There is no suggestion that any former worker or the group at large has a high likelihood of suffering adverse health outcomes, nor could there be given the objective, available data. In fact, the Checkoway study and the "cause of death" analysis clearly indicate otherwise. Satisfaction of this criteria requires "documented evidence of exposure of a population to a hazardous substance in the environment," based on exceedance of health based comparison values or levels shown to have adverse health effects in the peer review literature. No such documented evidence is provided in the PHA.

2. There is no well-defined, identifiable target population of concern in which exposure to a hazardous substance at a sufficient level has occurred. -- "The target population of concern is the population in which there is documented exposure at a sufficient level to place the individuals in that population at significant increased risk for developing some specific adverse health effect." The PHA has not identified any group of former workers that is at a significantly increased risk of any specific adverse health effect.

3. There is no documented human health research that demonstrates a scientific basis for a reasonable association between an exposure to a hazardous substance and a specific adverse health effect (such as an illness or change in a biological marker of effect). -- No study of the population of former workers at the Stauffer plant has demonstrated a "reasonable association between a particular exposure and an adverse health effect." The regulations also require that "[t]he period of exposure (including the time and duration of the exposure) and its relationship to the latency period for the disease or illness should also be examined if information is available." The limited worker exposure to the substances at issue, due either to limited length of employment at the plant or the limited percentage of

time actually spent with the substances of concern, favor the conclusion that there is no association between worker exposures and adverse health effects in this case. Certainly, none has been demonstrated. "Consideration should [also] be given to whether the association has demonstrated a dose-response relationship and whether the association is consistent with the existing body of knowledge." No dose-response relationship has been demonstrated at the levels of measured exposures at the Tarpon Springs plant; the body of scientific knowledge available further demonstrates this lack of association. A review of the current OSHA medical monitoring guidelines for the contaminants identified in the PHA reveals that if the plant were currently in operation, OSHA would not require monitoring for any of these compounds; therefore it would be absurd for the ATSDR to impose monitoring 22 years after the fact.

4. The monitoring would not be directed at detecting adverse health effects that are consistent with the existing body of knowledge and amenable to prevention or intervention measures. -- According to the regulations, monitoring should be established for specific adverse health effects, and should be a result of the possible exposure to the identified substance consistent with the existing body of knowledge. Moreover, "the adverse health effects (disease process, illness, or biomarkers of effect) should be such that early detection and treatment or intervention interrupts the progress to symptomatic disease, improves the prognosis of the disease, improves the quality of life of the individual, or is amenable to primary prevention." The health effects discussed in the PHA do not fit this description. Indeed, the U.S. Preventive Services Task Force's Guide to Clinical Preventive Services does not advocate testing for the health effects described in the PHA, and such was the finding of the Hoyte Court.

5. General requirements for a medical screening program would not be satisfied. -- For medical monitoring, the ATSDR criteria requires that "In order for a screening program to be of public health benefit, the population being screened should be at a significantly high risk for the undiagnosed disease (i.e., the disease should have a sufficiently high prevalence in the population)." "The early detection through screening should be known to have an impact on the natural history of that disease process." In addition, "There should be an accepted screening test that meets the requirements for validity, reliability, estimates of yield, sensitivity, specificity, and acceptable cost. . . . The medical monitoring program will use tests that have been recommended and used for screening in other settings." In this case, the literature on medical monitoring does not support medical monitoring for lung cancer, nasal cancer, or any generic classification of health effects.

6. An accepted treatment, intervention, or both, for the condition (outcome or marker of exposure) does not exist. -- There is no precedent for a medical monitoring program where there is not only no evidence of exposure at levels that could cause increased risk, but also no treatment or intervention for the adverse health effects that the PHA identifies.

The CERCLA statute provides for ATSDR to conduct a pilot study or full health study for the purpose of determining the health effects on a population exposed to hazardous

substances. Moreover, ATSDR does not have the statutory authority to do workplace assessments, which is the exclusive province of NIOSH. In rare cases, ATSDR has the authority to skip that step and proceed directly with a medical monitoring program, but to do so, it would have to determine based on the PHA that "there is a significant increased risk of adverse health effects in humans from exposure to hazardous substances." 42 U.S.C. 9604(i)(9). No such conclusion can be drawn from the PHA. This case deals with exposures that were of short duration, at levels that were overwhelmingly in compliance with OSHA limits, and with the last exposure occurring 22 years ago. There is not only no available, objective evidence of adverse health effects; in this case, the available, objective evidence affirmatively indicates the contrary -- that the former workers have not suffered any adverse health effects. Under the circumstances, medical monitoring for former workers simply cannot be justified. The recommendation of a workshop toward that end is, therefore ill-conceived and should be deleted from the PHA.

ATSDR Response:

1. ATSDR will consider any and all new data and information regarding former Stauffer worker-related exposures, including worker tenure. Toxicological evaluations will be done using this updated information along with mortality and morbidity epidemiological research results. Because there is no available worker exposure data for the first 25 years of operation, worker exposures were likely as great, if not greater, to those indicated by the industrial hygiene data from the early 1970s.

2. ATSDR did not make as a major conclusion in the PHA that a study of former worker would be inappropriate; this was addressed earlier (see ATSDR Response to Comment #4).

3. The goal of the Expert Panel meeting is not synonymous with the ATSDR publication "Final Criteria for Determining the Appropriateness of Medical Monitoring Under CERCLA." The Expert Panel meeting was conducted to seek independent advice from each of the panelists, (not to build consensus of ideas or recommendations), as well as to explore possible options, both scientific and service-oriented, for the benefit of former workers for ATSDR to take under consideration.

4. Because of the relatively small geographic area for former Stauffer ore processing and phosphorus production, along with evidence from historical photos, ATSDR believes that the likelihood of outdoor exposures was significant. Those workers who handled carcinogenic substances (e.g., asbestos) were at increased risk of adverse health effects compared with non-production workers (e.g., administrative/clerical staff).

5. We agree that there is a need to examine dose-response relationships; however, very limited personal sampling does not allow this to be done in a scientifically meaningful manner.

6. ATSDR has not proposed to conduct a workplace assessment; furthermore, this is not possible because the former Stauffer Chemical Company facility has been dismantled.

7. ATSDR has not proposed medical monitoring, as cited above, for former Stauffer workers.

Comment #40: With regard to off-site slag, ATSDR has confirmed, once again, that there are no health concerns with respect to off-site slag, as FDOH's Bureau of Radiation Control's investigation, echoing the results of numerous other governmental investigations of the issue, "assured ATSDR that the outdoor areas of slag (in roads and driveways) are not a health hazard." (PHA at page 135.) That conclusion, however, does not appear in the Executive Summary or in the discussion of miscellaneous health risks in Section 5. It should be explicitly stated there. In addition, the PHA repeatedly states without any basis that any phosphorous slag used in building materials in the region originated from the Site (PHA at pages 4, 13, and 68). In fact, as the ATSDR notes elsewhere and as the EPA concluded in its assessment of the issue, the Stauffer plant was not the only generator of slag in the area, and there is no proof that slag samples taken from nearby roadways and buildings originated from the Site. (PHA at page 33, "No conclusions could be made about the extent to which the Stauffer site slag material is contained in the surrounding community roads and buildings".) This point should be clarified as well.

With respect to on-site slag, ATSDR recommends that steps be taken to "[p]revent exposure to radiation in the on-site slag should the site be considered for residential development." (PHA at page 151.) However, this comment completely ignores the remediation that is expected to commence shortly, with cleanup standards set for radium-226. More importantly, SMC already has agreed to deed restrict the Site so that the Site will never be considered for residential development. The PHA's recommendation in that regard is thus misplaced and should be deleted.

ATSDR Response:
1. ATSDR has revised the Executive Summary and Section 5 of the final public health assessment to indicate that off-site slag in roads and driveways does not pose a public health hazard.

2. ATSDR acknowledges that the referenced text does not fully reflect the other potential sources of the slag materials used in off-site areas. Therefore, we have modified the text of the public health assessment to reflect the unknown source of the slag materials.

3. ATSDR has revised the recommendations of the final public health assessment to reflect SMC's intention to prevent development of the site for residential use.

Comment #41: The PHA describes river water and sediments as completed pathways and river biota as a potential pathway for exposure to Site contaminants. (PHA at pages 4, 69-70, 71-73.) Two points should be made with respect to this analysis.

First, the data does not establish that the Site is a contributor of contaminants to the river. Indeed, upstream and downstream river water samples exhibit almost identical concentrations. For example, fluoride concentrations of 80 mg/l and 81 mg/l (upstream and downstream of the Site, respectively) were measured in samples collected from the Anclote River in May 1991. Moreover, concentrations of radium-226 are often higher in river water samples collected upstream of the Site than in samples collected downstream.

Similarly, when Spaulding Environmental Associates (SEA) collected samples from the Anclote River between March 29 and April 4, 1993, it noted that the highest level of phosphate-phosphorus were observed at the sampling locations farthest upstream, while concentrations adjacent to the Site were less than or equal to 0.06 mg/l.

Second, the PHA does not find unusually elevated contaminant levels in river water or sediment, and concludes that Site contaminants are unlikely to accumulate in biota. (PHA at pages 4, 69, 72, and 103.) Presumably, for that reason, the PHA does not find a public health risk associated with these pathways, as Section 5 contains no discussion of any such risk and no recommendation is made concerning them. The PHA should, however, be explicit about that fact and place clear conclusions in the Executive Summary and Section 5.

ATSDR Response: Surface water and sediment meet the criteria for inclusion as a completed exposure pathway, that is, surface water has received past and current releases from site sources and people use the Anclote River for recreational purposes. As such, ATSDR evaluated the public health implications associated with possible exposures to the levels of chemical and radioactive substances detected in the river. The term "completed pathway" simply means that site contaminants could have reached people in the past, present, or potentially in the future. ATSDR's public health evaluation then determines whether harmful exposure occurred by looking at the detected levels, exposure conditions, and the toxicologic properties of detected substances. Based on available sampling data, ATSDR concluded that no harmful exposures have occurred. We agree that this conclusion could be more explicitly stated and have added or modified text in the PHA (see the Executive Summary and Section 4.1.4).

Without sampling data, we do not know definitively the extent to which river or Stauffer contamination may have affected the fish, particularly in the past. We tried to provide some perspective based on our understanding of the types and levels of substances detected in river water and sediment. We asked, given water and sediment quality documented in the river, how likely might be uptake by aquatic biota? As indicated in the PHA, ATSDR concluded that detected substances are not expected to accumulate to harmful levels in area fish. ATSDR agrees that its conclusion regarding biota could be more explicitly stated in the PHA and has added language to the Executive Summary and Section 4.2.3 to make this point more clearly.

Comment #42: The data supports many of the conclusions, recommendations and findings set forth by ATSDR in its PHA. For instance, the data supports ATSDR's findings that:

- **Off-site contamination found in some area private wells "has not been linked with the Stauffer site" (PHA at page 4);**

- **"Identified private wells are not in the direct path of flow of site groundwater contamination" and that "therefore, the source of the few detected elevated levels is not known."(PHA at page 2);**

- **"Public water supplies are not in the path of known contaminant migration and, as such, have not been affected by the Stauffer site." (PHA at page 2) (See also, PHA**

at page 3, "Nearby public water supplies have not been affected by the Stauffer site"); and

- **"Groundwater flow direction in both aquifers appears to be south to southwest, with discharge from both aquifers to the Anclote River." (PHA at page 21).**

Likewise, with respect to past on-site consumption of groundwater, the data supports ATSDR's finding that "measured contamination levels did not exceed health-based CVs in the wells known to have been used for drinking purposes." (PHA at page 3.)

However, notwithstanding the above, there are several inconsistencies in ATSDR's interpretation of the data. For instance, there is a strong tendency in the report to associate many off-site measurements of contaminants with the Site, despite a number of statements throughout the report that explicitly say otherwise. For some reason, measurements made on behalf of Stauffer off the Site are interpreted as on-site data. The most egregious example of this relates to the sample wells MW-11S and MW-04F. ATSDR acknowledges that these wells are located south of the Anclote River (See PHA at Table 6), and further acknowledges "the conclusion that no groundwater from the Stauffer site is occurring beneath and across the Anclote River" (PHA at page 21). ATSDR also states (as pointed out in the July 24, 2001 report of Flowscience Incorporated) that the January 1988 sample measurements in these wells are "suspect". Nevertheless, these data are included in Table 7 of the PHA ("On-site Groundwater Monitoring Summary Data, Surficial Aquifer") and Table 8 ("On-site Groundwater Monitoring Summary Data, Floridan Aquifer"). Furthermore, the discussion of these data is included in Appendix C, Section C.1. ("On-Site Contamination"). By comparison, discussion of water samples from several private and public water wells located very near to MW-11S and MW-04F on the south side of the Anclote River refers to these wells as off-site (see Appendix C Section C.2. ("Off-site contamination"), and Subsection C.2.2.1. ("Private Wells Off-site").

ATSDR Response: ATSDR's intent was to separate out monitoring data from drinking water well data. ATSDR understands that MW-11S and MW-04F are located south of the Anclote River and are not "on site." Note that Section 3.1.2.1 and Table 6 clearly stated this fact. We see, however, why the inclusion of MW-11S and MW-04F in Tables 7 and 8 ("on-site" groundwater monitoring summary data) and related discussions within the text and Appendix C might be confusing. The PHA has been revised, therefore, and now separates out the two off-site monitoring points. We have also added the results of more recent groundwater monitoring to PHA groundwater discussions and to Tables 7 and 8 (Parsons 2004).

Comment #43: A second example occurs in Sections 5.6.1., and 5.6.2., which focus on the risks from arsenic in groundwater. Section 5.6.1. refers to "Estimated dose to Stauffer residents. . . ." However, when one reviews the locations of the water supply wells where the arsenic in question was apparently measured, these wells could not be influenced in any way by Stauffer, as the report acknowledges on page 4 (first paragraph under Item C, "The source of these contaminants, however, has not been linked with the Stauffer site."). Thus the entire analysis of risk associated with arsenic has no bearing on Stauffer, but nevertheless the report describes "Stauffer residents" as the population at risk.

ATSDR Response: ATSDR agrees that referring to Stauffer residents is inappropriate. The text has been changed to read Tarpon Springs residents. However, it is appropriate for ATSDR to review and comment on the public health significance of arsenic in drinking water, regardless of where the arsenic came from.

Comment #44: A similar misstatement occurs in Section 5.6.3., which discusses the risks from lead in groundwater. The analysis of health risk focuses on one measurement of 270 ppb measured in a water sample at the Zervos residence at 905 Riverside Drive. This location is more than a mile south of the Site and across the Anclote River. Another high lead sample (160 ppb) is that from the Gibson residence at 1222 North Florida Avenue, which is also located south of the Site and across Anclote River. It is evident that the lead in these wells is in no way associated with the Site, but the analysis and discussion specifically address the risk of ingesting the groundwater with these high lead concentrations.

ATSDR Response: ATSDR agrees that the lead in these wells is probably not coming from the Stauffer site. However, it is ATSDR's responsibility to evaluate the public health significance of lead in drinking water if this issue arises during the course of the agency's assessment. ATSDR will revise text of the public health assessment to make it clear to the reader that the Stauffer site probably is not the source of the lead in these private wells.

Comment #45: In addition, in numerous places throughout the PHA, lead in drinking water is linked with liver and prostate effects, despite the fact that these are not generally accepted health concerns for lead.

ATSDR Response: Table 2-4 on pages 127 to 153 in ATSDR's 1999 Toxicological Profile for Lead provides a summary of peer-reviewed studies in lead toxicity that serve as the basis for deciding whether harmful effects might occur in people exposed to lead for varying periods of time. The studies are reported according to the time frame each study covers. For instance, those studies with exposure periods up to 2 weeks are studies 1 through 11 and are considered acute studies. Those studies that cover exposure periods of 2 weeks to 1 year are studies 12 through 107 and are considered intermediate exposures. Those studies that cover exposure periods greater than 1 year are studies 108 to 132 and are considered chronic exposures. As pointed out in the PHA, lead levels were low in December 2000, elevated in March 2001, and low again in May 2001. Therefore, exposure to high levels of lead could have occurred for only a few months. To evaluate exposure during this period, it is necessary to determine if health effects might occur from acute (up to 2 weeks) or intermediate (2 weeks to 1 year) exposure periods. Using the studies reported in Table 2-4, ATSDR identified 6 studies as pertinent to the specific exposure scenario at the Stauffer site. Specifically, studies 1, 2, 13, 14, 35, and 73 were used as guides to possible health effects. In these studies, exposures lasted from 5 days to 7 days and harmful effects were reported to blood, liver, and prostate. The range of doses in these studies was 0.01 mg/kg/day to 0.05 mg/kg/day. The LOAELs (lowest observed adverse effects levels) identified in these studies can be compared to a range of estimated doses for preschool children. The 90th percentile for tap water intake in preschool children is about 1 liter day or about four

8-ounce glasses. At this consumption rate of water, the estimated dose of lead for a preschool child weighing 16 kg is 0.017 mg/kg/day. The 90th percentile tap water intake for a 1-year-old child is 0.644 L/day, which results in an estimated dose of 0.017 mg/kg/day, assuming the child's weight is 10 kg. The estimated dose for a preschool child and a 1-year-old child drinking tap water with 160-ppb lead is 0.01 mg/kg/day. The estimated doses in children approach or exceed LOAELs reported from human and animal studies that showed harmful effects, and, therefore, it is appropriate to describe those harmful effects in the public health assessment. Specifically, studies 35 and 73 identify the liver and prostate as possible target organs.

Comment #46: On August 25, 2000, SMC and the EPA entered into an Agreement to conduct certain additional studies at the Site. One major portion of the Additional Studies Program was to complete a comprehensive site-wide groundwater characterization study, as well as a geophysical study across the Site and a solidification/stabilization treatability study on pond materials and soils. The objectives of the groundwater studies were to supplement existing data and to conduct a detailed, comprehensive analysis with respect to groundwater constituents, groundwater flow, Site conditions, and potential off-site impacts. The groundwater studies were conducted in conformance with the Groundwater Studies Work Plan and the Sampling and Analysis Plan developed for the Additional Studies Program, both of which had been reviewed and approved by the EPA and the Florida Department of Environmental Protection. The United States Geological Survey and the Corps of Engineers, as well as the Pinellas County Department of Environmental Management, also provided review and comment on the plans for the studies and provided additional project oversight. The field investigation was thorough and employed state of the art technology.

The results of the field investigation have recently been compiled, and the results confirm the conclusions drawn from earlier studies. Specifically the new data sustain the following conclusions:

- **The semi-confining layer (SCL) found in all deep monitoring wells in this study (except within the two geophysical anomalies in the eastern portion of the South Parcel) minimizes the cross-connection between the surficial and Upper Floridan aquifers.**

- **Confirmation, once again, based on both the sampling data and the Site hydrogeology, that the Site does not impact off-site drinking water wells.**

- **The primary constituents of concern (antimony, thallium, arsenic) are mainly found in the surficial aquifer, and are in or adjacent to localized source areas. Large areal plumes of primary constituents of concern do not exist at the Site.**

- **There is not a strong hydraulic connection between the surficial and Upper Floridan aquifers.**

- **Tides should have little or no effect on the proposed remedy in the unsaturated zone and the surficial aquifer.**

- **The Site hydrogeology is a relatively flat, low flow system with ultimate discharge to the Anclote River by both the surficial and Upper Floridan aquifers.**

- **There are no groundwater factors at the Site that should affect the implementation and long-term effectiveness of the remedy presented in the Record of Decision.**

The recently obtained data also indicates:

- **Groundwater contamination in the surficial aquifer appears to be localized in the pond areas in the North and South Parcels. These localized areas are closely associated with "Source Areas" and large area plumes of those Source Area constituents do not exist at the Site.**

- **Only one Upper Floridan well contained any of these Source Area constituents of concern (antimony and thallium as well as gross alpha). This well is located next to a source area and was originally installed with the screen compromising the SCL and allowing connection between the aquifers. A new adjacent Upper Floridan well contained none of these constituents. Downward migration of metals of concern from the surficial aquifer to the Upper Floridan aquifer was not found.**

- **The horizontal gradients in both aquifers are relatively flat and the vertical gradient between the aquifers is slightly downward. The flat gradients, in combination with the relatively low hydraulic conductivities of both aquifers, are indicative of a low flow velocity groundwater system.**

We will soon provide to ATSDR a copy of the Parsons "Groundwater Report", which includes all supporting data. We will also provide to ATSDR in the near future a copy of the soon to be completed "Geophysical Studies Report," prepared by SMC's contractor, Technos. The Geophysical Studies, like the Groundwater Studies, was conducted in conformance with work plans reviewed and approved by the EPA and the Florida Department of Environmental Protection. The United States Geological Survey, the Corps of Engineers, the Pinellas County Department of Environmental Management, and the local Technical Assistance Grant group also provided review and comment on the plans for the studies, and some of these agencies provided additional project oversight. These reports confirm that groundwater presents no risks and should be included in the PHA.

ATSDR Response: As written, ATSDR's PHA does not infer that site groundwater poses a health risk. The public comment draft discussed health implications of detected levels of contaminants in nearby private wells, but clearly indicates that the contaminants on which the discussions focused (arsenic and lead) have not been linked with the Stauffer site. See also response to Comments #5 and #42.

ATSDR has reviewed the Groundwater Studies Report (Parsons 2004) and the Geophysical Studies Report (O'Brien & Gere 2004) and agrees that contamination beneath the site appears in "spots" associated with source areas (e.g., the ponds) and does not exhibit any distinguishable plumes. These studies did reveal some connectivity between the surficial and Upper Floridan aquifer in discrete locations, primarily in the eastern portion of the site. Still, no site contaminants appear to have migrated in the direction of water supplies. ATSDR has added text to the PHA to present the findings of these more recent studies.

Comment #47:
The PHA recommends preventing, "exposure to radiation in on-site slag should the site be considered for residential development." (PHA at page 151.) As discussed in Section V.B. of these comments, SMC has already agreed to deed restrict the Site so that it will never be considered for residential development.

ATSDR Response: See ATSDR Response to Comment #40.

Comment #48:
The PHA recommends conducting, "follow-up activities for users of residential and commercial wells that contained elevated levels of arsenic and lead to determine whether the wells are still in use and to ensure that the users are aware of potential risks from past use of the wells." (PHA at page 151.) As acknowledged by the PHA and discussed in detail in Section VII of these comments, there is no association between the Site and elevated arsenic and lead in residential or commercial wells.

ATSDR Response: ATSDR agrees that arsenic and lead detected in several residential and commercial wells in the site area are probably not associated with groundwater contamination beneath the Stauffer site.

Comment #49:
The PHA recommends reviewing, "new site data, as they become available, for potential public health implications, including the results of the recent geophysical and hydrogeological site investigations." (PHA at page 151.) As discussed in Section VII of these comments, SMC encourages ATSDR to review the recent data which has become available, supporting the conclusion that the Site is not associated with any off-site groundwater contamination.

ATSDR Response: See response to Comment #46.

Comment #50:
The PHA recommends providing, "health education to former Stauffer workers focused on healthy habits for respiratory illness care and prevention through (1) local meetings, (2) established repositories, and/or (3) mailing using available mailing lists of former workers." (PHA at page 151.) While there is nothing wrong with providing health education generally, there is no evidence presented in the PHA that suggests a special need for Stauffer workers.

ATSDR Response: According to the findings of the public health assessment, there were documented exposures to several hazardous substances at levels of health concern during the operation of the plant between 1971 and 1981. This timeframe is the focus of the PHA. Through an extensive health education needs assessment completed by the ATSDR Division of Health Education and Promotion (DHEP), the former worker population was identified as a key target audience for health education activities. Additional details about the needs assessment can be obtained from ATSDR. Additionally, findings of the PHA and other related public health activities support the likelihood of adverse respiratory health impact of past exposures to the airborne contaminants present during site operations. Finally, health promotion information could be a benefit to this population specifically.

Comment #51:

The PHA recommends providing, "health education to local health care providers including health information related to (1) taking patients' environmental exposure histories and (2) available contaminant-specific case studies and fact sheets." (PHA at page 151.) Again, while there is nothing wrong with providing health education generally, there is no evidence presented in the PHA that suggests a special need for local health care providers in relation to Stauffer or the Site.

ATSDR Response: The extensive health education needs assessment conducted by the ATSDR DHEP also identified area health care providers as a key target audience for health education activities. DHEP is planning a number of activities to assist area health care providers to become more knowledgeable and proficient in preventing, diagnosing, or treating adverse health effects potentially associated with exposure to hazardous chemicals. Trained health care providers will also be able to better answer their patients' questions about health risks from the site.

Comment #52:

The PHA recommends continuing, "to provide health education to area residents and people who attended Gulfside Elementary from 1978 to 1981 through distribution of (1) Neighbor-2-Neighbor community newsletters for the Stauffer Site, (2) chemical-specific and exposure-related fact sheets, and (3) public health fact sheets." (PHA at page 151.) Once again, while there is nothing wrong with providing health education generally, there is no evidence presented in the PHA that suggests a special need for residents or people who attended Gulfside Elementary from 1978 to 1981 in relation to Stauffer or the Site.

ATSDR Response: The extensive health education needs assessment conducted by the ATSDR DHEP also identified individuals who attended Gulfside Elementary from 1978 to 1981 as a key target audience for health education activities. Therefore, DHEP will provide health education on chemicals identified in the findings of the PHA, such as sulfur dioxide and particulate matter, to the individuals who attended school during this period and were possibly exposed to these chemicals. In addition, DHEP will provide health education to area residents as appropriate.

Comment #53:

The PHA recommends providing, "health education materials in Greek if necessary based on the needs of the Tarpon Springs community." (PHA at page 151.) SMC does not believe

there is a demonstrated need to provide further health education material to the community, but if such materials are provided it is sensible to supply them in the languages that best fit the needs of the community.

ATSDR Response: ATSDR is committed to reaching the target populations in their preferred language. To this end, the ATSDR DHEP identified a Greek–speaking population in the area in the data collected in the needs assessment. Additionally, at recent public meetings hosted by ATSDR in the Tarpon springs community, there were public requests for the availability of documents in Greek associated with the PHA describing environmental exposure at Stauffer Chemical Company. The 2000 U.S. Census data also supports the presence of a small Greek-speaking population.

Comment #54:
The PHA recommends conducting, "a special workshop of medical experts for the discussion, input, and guidance for possible future health activities (e.g., focused health/medical screening) for former Stauffer workers." As discussed in more detail in Section IV of these comments, this recommendation is ill-conceived and based on a complete lack of support for instituting a medical monitoring program for former workers.

ATSDR Response:
1. ATSDR has not proposed medical monitoring for former Stauffer workers.

2. The ATSDR-hosted Expert Panel meeting was held on July 31, 2003 in response to a recommendation made in the Stauffer PHA report.

Comment #55:
The PHA recommends, "[f]or public health surveillance and health information purposes, continu[ing] to monitor the area for the annual incidence of mesothelioma and lung cancer." As discussed in the PHA, there is no current evidence of an increase in mesothelioma and lung cancer associated with the Site.

ATSDR Response: The multi-year cancer health statistic review indicates the possibility of an unusual pattern of mesothelioma for the four Census Tracts surrounding the Stauffer site. Mesothelioma in women was found to be significantly elevated during 1990–1994 (3 cases observed, 0.6 cases expected; SIR=5.0; $p<0.02$). At this time, ATSDR cannot prove or disprove any association with the Stauffer site. ATSDR, in cooperation with the FL DOH, will examine rates or cases of mesothelioma in these four tracts for the next 3 years.

Comment #56: Page 8-9: The uncertainty associated with estimating PM2.5 levels cannot be overstated. Wherever PM2.5 or PM10 values are presented, reference should be made to these being highly uncertain extrapolated values.

ATSDR Response: The comment suggests that the Executive Summary of the PHA should more prominently acknowledge the uncertainties associated with the estimated ambient air concentrations of $PM_{2.5}$ (and, to a lesser extent, PM_{10}). ATSDR's views on this issue, which were raised previously by the commentor, are discussed in ATSDR Response to Comment #16.

In short, we used two different approaches that derive from entirely different data sets to estimate $PM_{2.5}$ ambient air concentrations. Though both approaches have inherent uncertainties, the fact that the two approaches had reasonably consistent findings provides some confidence that estimated air concentrations do not grossly misrepresent Stauffer's past impacts on air quality. Nonetheless, the approaches we used have inherent uncertainties, and our estimated air quality impacts might be lower or higher than what actually occurred in the past. The Executive Summary of the PHA has been modified to reflect our overall assessment of estimated $PM_{2.5}$ concentration levels.

Comment #57: Page 9-10: The section labeled "Review of Community Health Concerns About Past Stauffer Air Emissions" concludes with the statement -- "ATSDR has not determined that any of these reported illnesses were elevated in the community in relation to exposures from Stauffer." This is a correct statement that should end with a period after Stauffer. It is meaningless to continue – "but only that they are consistent with findings from the scientific literature." It is well recognized that the health effects observed with high levels of exposure to particulate matter and sulfur dioxide are very common and not uniquely related to factors such as air pollution.

ATSDR Response: The fact that these health effects are also associated with other factors is discussed in the same section that is referred to in the comment. ATSDR believes it is equally important for the public to understand that ATSDR has not determined that any of these diseases are elevated in the community but to also know that they are consistent with the reported health effects of PM and SO2 exposures from the literature.

Comment #58: Page 17, Section 2.1.: At the end of the second paragraph describing land use in the area, it would be appropriate to add new sentences – "A major nearby industrial facility, currently and during the period of plant operations, was the Anclote Power Plant, a major source of particulate and gaseous emissions, including sulfur dioxide."

ATSDR Response: The comment suggests that text be added to Page 17 regarding the Anclote Power Plant. However, on Page 19 of the public comment release PHA the text reads: ". . . the Anclote Plant is a very large emissions source of several pollutants, including sulfur dioxide and particulate matter." We made no changes to Page 17 in response to this comment, but we did add text to Page 19 indicating that the Anclote Power Plant not only emitted sulfur dioxide and particulate matter while Stauffer operated, but also continues to emit these contaminants today.

Comment #59: Page 77 and Tables 41, 42 and 43: The use of a 100 ppb (1 hour average) level in these tables as representing an "adverse health effect" level is misleading.

ATSDR Response: As mentioned previously, ATSDR's Toxicological Profile for Sulfur Dioxide identifies 100 ppb as a less serious LOAEL.

Comment #60: Pages 77, 78 and 80: The repeated use of a 100 ppb level on these pages is inappropriate.

ATSDR Response: ATSDR disagrees.

Comment #61: Table 47: In addition to burying discussion of the specific studies in Table 47 of the appendix, the PHA gives the impression that there is greater certainty in the understanding of PM health effects than there actually is by typically referring to only one study and ignoring others with contrary results. For many of the physiologic end points listed in Table 47, a number of recent studies have been published, many with variable and inconsistent findings. As the peer review comments detailed, for example, for plasma viscosity, Table 47 cites only to the Peters et al. (1997) study, which observed a weak, non-significant association between elevated plasma viscosity and TSP during a large air pollution episode in Augsburg, West Germany. The effects of PM on blood viscosity/coagulability have been the subject of at least 8 recent studies. For example, Nadziejko et al. (2002) reports that there is some concern that the Peters et al. findings may be confounded by the effects of temperature, because sharp drops in temperature preceded the 1985 air pollution episode. With respect to other studies, Table 47 cites the Seaton et al. (1999) study as support for a biological mechanism involving red blood cell (RBC) sequestration, because this study reports an association between PM10 and reductions in hemoglobin levels. Yet Table 47 omits any mention that this study also found a statistically significant negative association between blood fibrinogen, a marker of blood viscosity/coagulability and ambient PM10 levels. In other words, these investigators found that blood fibrinogen levels were lower on days with higher PM10, indicating an anticoagulant effect of PM. In a 2-year cross-sectional study of over 7,000 London office workers, Pekannen et al. (2000) reported stronger and more consistent relationships between NO2 and CO and blood fibrinogen than with PM. In addition, Godleski et al. (2000) showed no effects on fibrinogen in PM2.5 CAPs experiments of dogs. These mixed study results for one high-profile hypothesis – the relationship between PM and blood viscosity/coagulability – illustrate the large uncertainty regarding the biological mechanism for PM-induced cardiovascular effects. Failure to include a full reporting of the literature is a significant deficiency in the ATSDR's analysis of PM health effects. In addition, this table of specific physiologic endpoints associated with particulate matter exposure is misleading in that it does not include information on the exposure levels associated with these changes.

ATSDR Response: ATSDR clearly indicates in the several sections of the PHA that a biological mechanism has not yet been established and that this is a source of uncertainty in our overall findings. Moreover, because we relied on the many population-based epidemiological studies to support our conclusions, we do not believe that an exhaustive reporting of all of these studies is needed. Furthermore, ATSDR believes that a reporting of the levels from the studies that we did summarize is not useful because, again, we did not rely on these studies to support our conclusions.

Comment #62: Table 48: All of the TSP (annual) values shown are below the NAAQS for annual average concentrations of 75 µg/m3 that was operative up until 1987. All of the estimated annual PM10 values are below the NAAQS for PM10 for annual average concentrations of 50 µg/m3, promulgated in 1987.

ATSDR Response: ATSDR agrees with the conclusions of the comment regarding Table 48. However, as can be seen from Table 49, the estimated PM2.5 annual average levels were above the current EPA standard of 15 ug/m^3. It is true that none of the annual geometric mean concentrations or 24-hour average concentrations were higher than EPA's former health-based air quality standards for TSP (75 µg/m3 and 260 µg/m3, respectively). However, many states have implemented more stringent air quality standards for TSP. Florida's air quality standards for TSP, for example, were 60 µg/m3 for annual geometric mean concentrations and 150 µg/m3 for 24-hour average concentrations. As Table C-6 indicates, the annual geometric mean concentrations at the Anclote Road monitoring station were higher than the state of Florida's standard from 1977 to 1981. Further, 24-hour average concentrations at the Anclote Road monitoring station exceeded the state of Florida's air quality standard on 8 days between 1977 and 1981.

For some PM sources that consist primarily of larger particles (like dust storms), the previous TSP standard was probably protective of public health. However, since this standard was established, much has been learned about how particle size is related to adverse lung and heart effects; that is, the smaller or finer particles are more likely to be associated with such effects. Because of this knowledge, the EPA has moved towards making the PM standard a measure of the smaller-sized particles by first implementing a PM10 and then a PM2.5 standard. Therefore, because ATSDR believes that it is likely that Stauffer and other sources in the area contributed appreciable amounts of fine particles to overall PM loading and exposures, then it is possible that the previous EPA TSP standard in the area of Stauffer Chemical was not as protective of public health as the Florida standard.

ATSDR discusses the EPA's National Ambient Air Quality Standards on page 59 of the public release version of the health assessment. ATSDR will review the public health assessment to ensure that proper reference is given to national ambient air quality standards.

Comment #63: Table 49: The estimated PM2.5 values in this table are highly uncertain because of the complexity of the extrapolation from measured total suspended particulates measurements to estimated PM10 and then to estimated PM2.5. Such highly uncertain values should not be used as a basis for discussing potential health impacts.

ATSDR Response: The comment correctly notes that our approach of estimating PM2.5 levels from measured TSP levels involves considerable uncertainty. ATSDR acknowledged this uncertainty throughout the public comment release PHA, and this uncertainty continues to be noted in the final document.

ATSDR emphasizes, however, that we estimated Stauffer's potential air quality impacts using two approaches that rely on two entirely different data sets. One approach was a "top-down" approach, in which we took measured levels of particulate matter and used the best available information on particle size distribution to back-calculate what amount could be attributed to Stauffer's emissions. The other approach was a "bottom-up" approach, in which we took data on emission rates and meteorological conditions and used a dispersion model to estimate the air quality impacts from Stauffer's emissions. Despite the fact that both approaches have inherent uncertainties (of different origin), the two approaches reached very similar conclusions, which

gives ATSDR comfort that the estimated PM2.5 levels do not grossly misrepresent Stauffer's past air quality impacts.

To respond to this comment, ATSDR added a footnote to Table 49 that acknowledges the uncertainty in the calculations and refers the reader to other text in the PHA that addresses this topic further.

Comment #64: Page 83, Line 20: The term "ambient concentration" should be used instead of "exposure level" here and elsewhere in the report when discussing ambient measurements. Ambient measurements do not equate to actual exposures.

ATSDR Response: ATSDR agrees that the term "ambient concentration" (or "ambient level") is more appropriate in the sentence on line 20, page 83. ATSDR will review other sections of the public health assessment to determine whether "exposure" or "ambient concentration" is more appropriate and will revise these sections as necessary.

Comment #65: Page 85: The PHA lists redness (i.e., inflammation) of the trachea and bronchi and increased numbers of inflammatory cells in lung fluid as serious effects that can occur with relatively short exposures (e.g., 10-20 minutes) to SO2 concentrations between 1,000 and 8,000 ppb. However, as indicated in Table 42, redness has only been observed in one human study at 8,000 ppb SO2, while increased inflammatory cells have only been observed in one study, at 4,000 and 8,000 ppb SO2. Based on the monitoring data presented in the PHA, it is unlikely that SO2 concentrations in the vicinity of the Stauffer plant were ever as high as 4,000 ppb. Consequently, it is misleading to suggest that individuals may have experienced more severe health effects that occur only at SO2 concentrations substantially higher than those that likely occurred in the vicinity of the Stauffer plant. References to these potential health effects should thus be removed.

ATSDR Response: As described in the public health assessment, hourly measurements of sulfur dioxide levels at the Anclote Road monitoring station show that the highest hourly sulfur dioxide level was 840 ppb. According to information from EPA, the maximum sulfur dioxide levels during this hour might have been 2 to 3 times this amount, or 1,600 to 2,500 ppb. Because these potential sulfur dioxide levels approach the levels of 4,000 ppb to 8,000 ppb that have been shown to cause redness of airways and increased inflammatory cells, it is reasonable to assume that these effects might be possible in some people. It should be pointed out that the limited human studies available do not show what a safe level for these more serious effects is. Therefore, it is prudent public health practice to point out the possibility of these more serious effects when exposure levels approach these higher sulfur dioxide levels.

Comment #66: Page 87: Section 5.3.1 begins with a laundry list of health effects that have been associated with PM exposures, but it is not clearly stated that these are epidemiological associations and not doctor-diagnosed cases with a causal conclusion. The PHA should discuss what it is meant by the term "associated" so that a clear distinction is made between actual proven and estimated statistical health effects.

ATSDR Response: ATSDR is not sure what is meant by "doctor-diagnosed cases with a causal conclusion." A diagnosis by a medical doctor does not prove causality to a particular exposure. Moreover, many of the overall health effects associated with PM exposures listed at the beginning of this section are from health studies that have used doctor-diagnosed cases from hospital admissions and death certificate records. ATSDR has attempted, in several sections of the PHA, to provide the reader with some perspective on the differences between an association and causality.

Comment #67: Page 89, Last Paragraph: "Schwarz" should be "Schwartz".

ATSDR Response: Thank you. ATSDR will correct the spelling of Dr. Schwartz's name in the PHA text.

Comment #68: Page 91: Analysis of ambient air monitoring data: The report should more clearly describe the very large uncertainty associated with estimation of PM2.5 concentrations from extrapolation from TSP to PM10 and then PM10 to PM2.5. The overall extrapolation that PM2.5 represents 30 percent of the TSP is highly uncertain.

ATSDR Response: In general, our response to Comment #63 applies to this comment as well. This comment suggests that analyses documented on Page 91 of the public comment release PHA should describe the uncertainty associated with our calculations. The paragraphs that immediately followed this passage (i.e., on page 92 of the public comment release PHA) do acknowledge the uncertainties in this evaluation. More importantly, the subsequent paragraphs indicate that ATSDR used two different approaches to estimate air quality impacts from particulate matter, noting that the results from these approaches are quite similar. ATSDR continues to maintain that our estimated particulate matter exposure concentrations are based on the best available information for the site.

Comment #69: Page 91, Line 25: Secondary formation of aerosols is unlikely to be very significant near the source, as acknowledged elsewhere in the report.

ATSDR Response: ATSDR agrees that secondary formation of aerosols is likely insignificant for near-field receptors. We have removed the sentence of concern from the PHA and revised the paragraph in which that sentence appeared.

Comment #70: Page 94, Second Complete Paragraph: Krewski et al. [2002] should be changed to Krewski et al. [2000].

ATSDR Response: Thank you. ATSDR will correct the date of the article in the PHA text.

Comment #71: Page 111, First Complete Paragraph: Table 53 should refer to Table 54.

ATSDR Response: Thank you. ATSR will correct the table number in the PHA text.

Comment #72: Table 56: The PHA summarizes the occupational data in Table 56. Unfortunately, if one wants to understand the data, one has to read all the sampling data,

which is not feasible (especially since they are not included in the document, nor are they all collected in one place; they are only available in a collection of memoranda, reports, and a spreadsheet). Thus, we recommend that all of the data be presented in an appendix in tabular form. We also recommend specific changes to Table 56. The column heading "frequency" actually contains the total number of samples collected. Thus, this column should instead be labeled "N" to signify the total number of samples. "Frequency" implies a detection frequency and has the format of x/y where x is the number of samples that had a detected concentration and y is the total number of samples collected for that particular analyte. "Type" (TWA, partial, or grab) seems to refer to the sample with the maximum concentration, but this is not explained anywhere; it could and should be added as a footnote to the table. The distinction between grab, partial, and TWA samples should also be explained. Samples that are area samples and not personal samples should be designated. Also a footnote should be added indicating that a value with < in front of it signifies a limit of detection. Table 56 should contain the following data in addition to the maximum and minimum concentrations: whether the sample was an area, personal, or grab sample (this is mentioned for most samples but not for the asbestos samples, for example), the mean and UCLM values, if known, and other pertinent information. For example, the nickel and chromium results are both for mechanics who were welding, a task they perform only sporadically. This should be noted. See Table 1 for an example of such a table compiling the data for chromium.

ATSDR Response: Thank you for your comments. ATSDR has modified Table 56 to incorporate many of the suggested changes.

Comment #73: Table 57: The designation of a 5 ppm TWA STEL for SO2 is incorrect; it should simply be STEL; it is not possible to have a limit that is both a TWA and a STEL. Also, this table contains the threshold limit values (TLVs) recommended by the ACGIH, yet the text discusses only the OSHA permissible exposure limits (PELs), so there is a disconnect between this table and the analysis conducted, as reflected in the text.

ATSDR Response: The STEL designation for sulfur dioxide has been corrected in the table. For its review of worker exposures at SCC ATSDR reviewed not only OSHA standards, but also recommendations from NIOSH and ACGIH. The value listed in the Threshold Limit Value column of Table 57 is the most conservative value. There is no disconnect between the table and the analysis conducted. ATSDR's focus in evaluating former worker exposures at SCC was to determine, based on the very limited data made available to the agency, whether former workers could have been exposed to levels of contaminants that might cause adverse health effects, regardless of whether an OSHA occupational standard was exceeded.

Comment #74: The PHA says at page 112 that the maximum concentration of contaminants was compared to: OSHA PELs, which are regulatory values that apply specifically and only to the workplace; ACGIH TLVs, non-regulatory occupational guideline values; EPA toxicity criteria, non-regulatory values for the general public; and ATSDR guidance values (e.g., CREG, MRL), and the reader is referred to Table 57 in Appendix B. Table 57, however, seems to reference only TLVs or STELs, terminology that is only applicable to ACGIH recommended levels. We reviewed the numbers, and they all

seem to come from ACGIH, although some numbers are the same for both ACGIH and OSHA. However, the OSHA PELs are not listed (unless by chance they are the same number as the ACGIH number) nor are NIOSH RELs or IDLHs listed. Further, EPA RfCs (properly written RfCs not RFCs) are listed, though not mentioned in the text. This dichotomy between the tables and the text should be rectified. If only ACGIH values were used for comparison in the column labeled TLV, then the text should either not list the OSHA PELs or it should say that PELs were considered only insofar as they were identical to the ACGIH TLVs. It would be helpful to explain why this is so – in other words, the rationale for the approach should be provided. Also, the PHA compares some samples to current standards and others to standards in force at the time of sample collection; the basis and reasoning behind this should be explained or the standards should be from a consistent time period (and the basis for such a selection clarified).

ATSDR Response: Thank you. RFC was changed to RfC in the table. As indicated in the response above, ATSDR reviewed not only the OSHA regulatory standards, but also other guidelines and recommendations (i.e., ATSDR, EPA, ACGIH, NIOSH) in its evaluation of contaminants for former SCC workers. ATSDR used the most conservative values in its evaluation process—the agency's focus was on whether exposure to former SCC workers occurred at levels that might cause adverse health effects, not whether an occupational standard was exceeded.

Comment #75: Few of the acronyms here are included in Appendix D (Description of Comparison Values and Other Health-Based Guidelines). This would be an appropriate place to explain terms such as TLV, PEL, REL, STEL, IDLH, RfC, TWA, etc. At present, they do not appear to be explained anywhere in the document.

ATSDR Response: Thank you. The requested acronyms have been added to Appendix D**.**

Comment #76: Table 58: Table 58 does not list the cancer toxicity criteria used or the risk calculations. The cancer criteria are: 2.3E-1 per f/ml for asbestos and 1.2E-2 per µg/cubic meter for chromium. Both come from EPA's IRIS database, available online, and both are unit risk factors, which are used for cancer assessment via inhalation, not cancer slope factors, which are used exclusively for the oral route. (The current text under Table 58 states that cancer slope factors were used, when in fact unit risks were used.) The notes under Table 58 could easily be modified to be accurate and complete as shown below. The IRIS unit risks apply to residential exposure, which is assumed to occur 24 hours a day, 365 days a year, for a lifetime of 70 years. To adjust these factors for workers, who are exposed 8 hours a day, 50 days a year, for 20 years, ATSDR used the following adjustment factors: 8/24 hours, 50/365 days/year, and 20/70 years, yielding the following equation:

where:

Cair = Concentration of chemical in air (ug/m3)
ET adj= Adjustment for exposure time (hours/day)
EF adj= Adjustment for exposure frequency (days/year)
ED adj = Adjustment for exposure duration (years)

URinhal= Inhalation Unit Risk (µg/m3)-1:
= 2.3E-1 per f/ml for asbestos
= 1.2E-2 per µg/m3 for chromium
Cair = 0.33 f/ml for asbestos
= 0.46 mg/m3 = 460 mg/m3 for chromium

This equation yields a cancer risk of 9.9E-04 for asbestos and 7.2E-02 for chromium (total).

ATSDR Response: Thank you for your input. ATSDR has modified Table 58 to incorporate the above comments for clarity; however, these modifications do not change the overall conclusion.

Comment #77: Page 4, First Bullet: ATSDR's statement that "Slag generated by Stauffer processes was stored on-site and used as roadway and building material throughout nearby communities" has not been established by the data. In point of fact, the Site was not the only elemental phosphorus processor in the area and as ATSDR elsewhere recognizes (PHA at page 33), EPA has found that "No conclusions could be made about the extent to which the Stauffer site slag material is contained in the surrounding community roads and buildings".

ATSDR Response: ATSDR acknowledges that the bulleted item does not fully reflect the other potential sources of the slag materials used in off-site areas. We have therefore modified the text of this bullet in the Executive Summary to reflect the unknown source of the slag materials.

Comment #78: Page 68: ATSDR's statement that "Slag material generated from Stauffer operations was routinely used in the construction of homes, driveways, and roadways in nearby communities" is not established by the data. In point of fact, the Site was not the only elemental phosphorus processor in the area and as ATSDR elsewhere recognizes (PHA at page 33), EPA has found that "No conclusions could be made about the extent to which the Stauffer site slag material is contained in the surrounding community roads and buildings".

ATSDR Response: ATSDR acknowledges that the statement on Page 68 does not fully reflect the other potential sources of the slag materials used in off-site areas. We have therefore modified the text of this bullet in the public health assessment to reflect the unknown source of the slag materials.

Comment #79: Page 110: ATSDR's chronic MRL for arsenic is the dose below which harmful effects are not likely. For arsenic, the chronic MRL is 0.3 µg/kg/day arsenic; therefore, whenever someone's estimated dose is below 0.3 µg/kg/day, harmful effects are not likely. As can be seen in Table 53 in Appendix B of the PHA, all of the estimated doses from surface soil and slag for children and adults are below the chronic MRL. This should be clearly stated in the PHA.

ATSDR Response: On page 110, the PHA clearly states that the estimated doses from surface soil and slag for children and adults are below the chronic MRL. Here is the actual text in the

PHA: "As can be seen in Table 53 in Appendix B, all of the estimated doses from surface soil and slag for children and adults are below the chronic MRL."

ATSDR has added to the following statement to ensure that readers understand what it means to be "below the MRL": ". . . therefore, arsenic in surface soil and slag are not likely to cause harmful effects in children and adults."

Comment #80: Page 2, Second Arrow: ATSDR states: "Surface water samples (from the Anclote River) contained the following contaminants at levels above drinking water CVs at least once: antimony, arsenic, boron, chromium, iron, lead, thallium, vanadium, fluoride, sulfate, gross alpha and beta radiation, and radium-226. Contaminants detected and for which no CVs are available include calcium, magnesium, sodium, phosphorus, and polonium-210." This is a very misleading and wholly unscientific statement. One would expect a number of the drinking water CVs to be exceeded when river estuary water is being sampled very close to the ocean. Much of the time the water sampled will in fact be seawater. It is not surprising that sulfate and boron and fluoride exceed their drinking water CVs and that the contaminants calcium, magnesium, sodium, phosphorus and polonium-210 are detected. Most of these elements would be significant components in any analysis of seawater. Furthermore, because of the estuarine location, there is a tendency for particulate matter to accumulate as the surface charge on the river-borne particles is suppressed by the ionic strength of the seawater. It is therefore not surprising to find an accumulation of some of these elements in water samples from this location.

ATSDR states: "Arsenic, boron and sulfates were consistently detected at levels above CVs throughout the river." Of course arsenic, boron and sulfate would be above a drinking water CVs for samples taken in the estuary. Standard sea water has about 4 ppb of arsenic, 4,400 ppb of boron and about 2,700,000 ppb of sulfate. The CV values quoted for each of these three entities are arsenic 0.02 ppb, boron 600 ppb, and sulfate 250,000 ppb (see Tables 16, 17, and 18). It is simply impossible for any seawater sample to meet the quoted CVs, which simply emphasizes the inappropriate choice of drinking water CV for the river water samples.

ATSDR Response: Screening environmental contaminant concentrations against CVs is a key step in ATSDR's health assessment process. While drinking water CVs are not an ideal comparison, they are used as a conservative screen to identify chemicals requiring further evaluation, the premise being that if detected contaminant levels are below levels considered safe to drink, absolutely no health concerns exist under existing surface water exposure scenarios (i.e., incidental ingestion during recreational activities). This is stated on page 35 of the PHA. Exceeding a CV does not mean or imply that adverse health effects are expected. ATSDR considers a number of factors, including comparison to background concentrations, when evaluating exposures and providing public health perspective. Page C-27 clearly states that several elements are naturally occurring in this type of environment; a similar statement has been added to the Executive Summary and to Section 3.2.3.

Comment #81: ATSDR states: "Gross alpha and beta radiation levels are similar both upstream and in Meyers Cove, but radium-226, radon, and polonium-210 are at least three times higher in Meyers Cove than in areas immediately upstream."

The maximum measured gross alpha and gross beta values at the four sample locations given in Tables 16, 17, 18, and 19 are given in the following table.

Location	gross alpha	gross beta	radium-226	Radon	polonium-210
Upstream	199	583	5.4	120	14
Adjacent	30	110			
Meyers Cove	400	500	26	240	62
Downstream	50	280			

Based on the limited data samples available and a statement of the maximum values measured it is not statistically valid to conclude anything about the difference in the statistical distributions of these data. The implication of the ATSDR statement is that Meyers Cove is somehow impacted by the Site. This conclusion may not be drawn. It is simply poor science to make this value judgment, which is based upon the maximum value of a limited number of samples.

ATSDR Response: The language in the bullet states that detected concentrations in Meyers Cover are higher than in other parts of the river but does not suggest that Meyers Cove was influenced by the site. ATSDR's goal is to report observed concentrations and trends. The sentence could be clearer in stating that maximum concentrations were compared, and that a statistically rigorous analysis was not conducted. Therefore, a phrase will be added to clarify this point both in the Executive Summary and in Section 3.2.3.

Comment #82: Page 35, Last Paragraph: The inappropriateness of using drinking water CVs to evaluate a river estuary located so close to the ocean is discussed above. It simply makes no sense when natural seawater concentrations of elements far exceed the drinking water CVs. The use of soil CVs to evaluate sediment concentrations likewise makes little sense given the underlying assumptions regarding the ingestion of soils that define the soil CVs. It is unlikely that any child would eat soil soaked in seawater, which is a relatively strong emetic.

ATSDR states: "Arsenic, boron, and sulfates were consistently detected at concentrations above CVs throughout the river." The self-evident nature of this statement was discussed above. Natural sea water concentrations of arsenic, boron, and sulfates guarantee that the CVs for drinking water will be exceeded. The problem is the inappropriate use of the drinking water CVs.

ATSDR states: "Although gross alpha and beta radiation are similar both upstream and in Meyers Cove, radium-226, radon, and polonium-210 are at least three times higher in Meyers Cove than in areas immediately upstream." This is not correct, as discussed above.

ATSDR Response: See response to Comment #81. Also note that the first paragraph on page 35 clearly describes how and why drinking water and soil CVs were used to screen surface water and sediment, respectively.

Comment #83: Page 2, Third Arrow: ATSDR states: "Sediment samples (from the Anclote River) contained arsenic, thallium, fluoride, radium-226, polonium-210 at levels that exceeded CVs at least once. The highest concentrations of these contaminants were detected (a) in Meyers Cove and (b) during the 1988 and 1989 sampling events."

The highest concentrations in the referenced samples are presented in the following table, with data taken from Tables 20, 21, 22, and 23.

Location	Arsenic	thallium	fluoride	radium-226	polonium-210
Upstream	1.6	-	18,000J	-	-
Adjacent	3.4	-	9,000J	0.79	2
Meyers Cove	8.5J	-	6,900J	2.4	7.7
Downstream	1.9	7,800	360J	-	-

As is evident from the table, the quoted statement above is simply not correct. Furthermore, the J qualifier on the data implies that the measurements were below the quantitation limit and are simply estimates; thallium was not analyzed for at Meyers Cove, and because upstream and downstream measurements of radium-226 and polonium-210 were not made, we do not know if Meyers Cove is the location of maximum sediment concentrations.

ATSDR Response: ATSDR agrees that, as written, this point could be misinterpreted and has revised the text to reflect the following: Three of the five contaminants detected above CV (i.e., arsenic, thallium, and fluoride) were measured at each of the four stream sections. Three of the five contaminants (i.e., arsenic, radium-226, and polonium-210) were highest in Meyers Cove.

Comment #84: Page 2, Last Paragraph: ATSDR states: "The highest concentrations of aluminum, arsenic, barium, chromium, silver, and vanadium were detected at Meyers Cove."

The following table summarizes the relevant data from Tables 20, 21, 22, and 23:

Element	aluminum	arsenic	barium	chromium	silver	vanadium

conc. (ppm)	**9,500**	**8.5J**	**16**	**30**	**2.4J**	**32**
CV	**100,000**	**0.5**	**4,000**	**200**	**200**	**200**

With the exception of arsenic all of the metals discussed are so far below the CV concentration that the relevance of the point made is not apparent. With respect to arsenic, the concentration is an estimate because the measured value was below the quantitation limit of the test procedure. It is not really known what the sediment concentration of arsenic was at Meyers Cove, except that it is known that the maximum in ten years of measurement was probably below the figure given. In any case, the appropriateness of soil CVs for sediment is dubious and unsupported.

ATSDR Response: The paragraph clearly states that concentrations were below CVs. As mentioned previously, CVs are used only for screening purposes and soil CVs are therefore appropriate to use as a screen for sediment. ATSDR realizes that J qualified data are estimated values, but considers them valid data and suitable for use in our public health assessments. Before ever drawing any public health conclusions, agency health assessors review complete data sets to evaluate trends in detected concentrations (e.g., outliers, spatial distribution). This information, along with our exposure evaluation, enables us to draw our public health conclusions.

Comment #85: Page 4, Second Arrow and Page 69, Bulleted Paragraph: ATSDR states: "The highest detected contaminant concentrations in sediment were found in Meyers Cove." The maximum sediment concentrations of contaminants measured in Meyers Cove are listed in Table 22. With the exception of arsenic and fluoride, in every case the concentrations are far below CV values, so that the concentrations are not a public health issue. The maximum arsenic and fluoride concentrations are only estimates since the measured concentrations were below quantitation limits and these estimates are based upon measurements made 15 years ago.
ATSDR Response: ATSDR acknowledges and states on pages 4 and 69 of the PHA that these levels are not unusually elevated. As stated above, ATSDR realizes that J qualified data are estimated values, but considers them valid data and suitable for use in our public health assessments. Before drawing any public health conclusions, agency health assessors review complete data sets to evaluate trends in detected concentrations (e.g., outliers, spatial distribution). This information, along with our exposure evaluation, enables us to draw our public health conclusions.

Comment #86: Page 35, First Paragraph: As is the case with respect to analysis of the Anclote River, soil CVs are not directly applicable when evaluating sediment exposures as well. Soil CVs are developed based on the assumptions that quantifiable amounts of soil and associated dust can be incidentally ingested on a daily basis. Sediments, on the other hand, tend to have greater water content, are typically submerged, and are relatively inaccessible, likely making contaminants less directly bioavailable.

ATSDR Response: As stated previously, CVs are used only for screening purposes and no health conclusions are drawn from them. The text of this paragraph clearly recognizes the limited applicability of soil CVs, and explains how and why they were used.

Comment #87: Page 36, Third Paragraph: ATSDR states: "With these three exceptions, however, fluoride concentrations are generally higher in Meyers Cove than elsewhere in the river, though below its CV." Tables 15, 16, 17, 18, show a CV for fluoride of 4.000 ppb, while the peak concentrations of fluoride range up to 80,000 ppm upstream of Meyers Cove but not downstream, indicating a very strong source of fluoride above Meyers Cove.

ATSDR Response: The noted paragraph discusses the maximum concentration as being detected upstream of Meyers Cove and suggests with that exception, fluoride concentrations in Meyers Cove are generally higher than those measured on other portions of the river. The purpose of discussion in this and other parts of Section 3 is to describe environmental conditions based on available sampling data. ATSDR notes observed trends in efforts to understand possible exposure conditions. ATSDR's ultimate goal is to identify and evaluate conditions at the point of exposure, then evaluate whether exposures are of health concern. It is not our intent or charge to evaluate source attribution specifically.

Comment #88: Page 69, Bulleted Paragraph: ATSDR states: "The highest detected contaminant concentrations in sediment were detected in Meyers Cove." This comment is addressed above.

ATSDR Response: See response to Comment #83.

Comment #89: Page 72, Fourth Full Paragraph: ATSDR states: "No widespread contamination of the river is indicated, but some higher concentrations of Stauffer-related contaminants were reported in Meyers Cove." This comment is addressed above. The concentrations are irrelevant given their magnitude in relation to the soil CVs.

ATSDR states: "No widespread contamination of the river is indicated, but some higher concentrations of Stauffer-related contaminants were reported in Meyers Cove." This comment is addressed above. The concentrations are irrelevant given their magnitude in relation to the soil CVs.

ATSDR Response: As mentioned in previous responses, ATSDR's public health assessment process includes a comprehensive exposure evaluation, which involves studying environmental contaminant data and how people might come in contact with site-related contaminants. As described on page 34 (Section 3.2.3), we studied four distinct regions within the river to enable a critical assessment of site impact on river quality and to characterize conditions at various exposure points near the site. The statement of page 72 regarding observed conditions in Meyers Cove was intended to identify any areas, in the absence of fish/shellfish data, of possible concern. In doing so, we were able to demonstrate that even where the most elevated contaminant levels have been reported, the likelihood of contaminant accumulation in fish is low. We, therefore, do not feel this statement is irrelevant.

Comment #90: Page 2, Last Paragraph: The PHA now recognizes background as a potential source of metals in soils, but background is not discussed as a potential source of groundwater contaminants, although the data indicate this to be so. In addition, a comparison with background would be better made through the use of tables.

ATSDR Response: On page 2, ATSDR acknowledges that the source of groundwater contaminants (e.g. arsenic) is unknown and could be due to natural background. We have also added text in Section 4.2.1 noting this point.

Comment #91: Page 21, Third Paragraph: ATSDR states: "Because of the tidal influence, conditions in the aquifer are considered 'dynamic' with short term fluctuations in flow rate and directions . . . ." This statement ignores the processes associated with tidal flows in porous media. The tidal influence travels back through the aquifer, as a wave of water surface elevation and the associated water particle movement is quite small. There are certainly changes in the flow rate on a time scale of the tides and there may be some brief period of upstream flow (for a very limited distance from the Anclote River), but any fluid particle in the ground will have, in the course of a day, a net movement from the northeast to the southwest.

ATSDR Response: Using available studies, the PHA clearly presents the understanding of area groundwater flow. ATSDR notes in the first sentence of the paragraph that groundwater flow direction is south to southwest, with discharge to the Anclote River. The fifth sentence notes that despite tidal fluctuations, the flow direction is still to the southwest, toward the river. The conclusion regarding groundwater flow is further supported by the more recent groundwater studies conducted by Parsons (2004). As in Parsons 2004, we have added text noting that groundwater flows in a southeasterly direction in some portions of the north parcel, with ultimate flow turning southwest towards the Anclote River. Some other minor text revisions have been made to reflect the more recent studies; in addition, the Parsons 2004 findings and citation have been added to the appropriate sections of the PHA.

Comment #92: Page 29, Last Paragraph: ATSDR states: "Table 7 (surficial aquifer) and Table 8 (Floridan Aquifer) in Appendix B summarize groundwater sampling data from on-site monitoring wells and two monitoring wells (MW-11S and MW-04F) southwest of the site on the other side of the Anclote River". As discussed above, Table 7 is labeled "On-site Groundwater Monitoring Summary Data, Surficial Aquifer", and Table 8 is labeled "On-site Groundwater Monitoring Summary Data, Floridan Aquifer", which are not correct. Furthermore, as noted above the highest concentrations listed in these tables are related to the January 1988 NUS Report and are most probably inaccurate, for the reasons discussed in the Flow Science report, dated July 24, 2001, and acknowledged in the PHA Report.

ATSDR Response: As discussed in previous responses, ATSDR understands and clearly acknowledges in Section 3.1.2.1 that MW-11S and MW-04F are located south of the Anclote River. ATSDR included these wells to separate monitoring well data from drinking water well data. Recognizing the confusion this might have caused, we have revised the PHA to present the results of on-site and off-site monitoring well sampling separately.

ATSDR also acknowledges the questionable nature of NUS 1988 results; this is clearly stated on pages C-18 and C-19, when addressing these sampling results.

Comment #93: Page 34, Second Paragraph: There should be a paragraph here that summarizes the basic scientific conclusion of all of the off-site well analyses, which is there is essentially a complete absence of the two primary indicators in the private and public wells that are indicative of the Site, namely fluoride and phosphorus. Given the high mobility of fluoride and the pervasive presence of fluoride in the groundwater on the Site, its absence in the offsite wells is essentially conclusive proof that the Site is having no impact on offsite wells. The PHA should so state.

ATSDR Response: ATSDR concurs with SMC's argument regarding the scientific evidence that the site contaminants do not appear to be impacting off-site wells. As stated previously, our evaluation of off-site private wells was triggered by our desire to understand thoroughly area groundwater conditions and to respond to specific community health concerns. We believe Section 3.2.2 (pages 33 and 34) make it clear that detected levels of substances in private/potable wells were not greatly elevated, and further, were not site related.

The third sentence of the first paragraph on page 34 states "Note that fluoride (a known contaminant beneath the Stauffer site) was detected in only 3 of the 30 potable wells—at concentrations well below the ATSDR CV (less than 270 ppb)." The next sentence goes on to state that the levels are below background. Because Section 3 addresses environmental contamination and other hazards—not public health implications—it is not necessary to draw further conclusions from these data. It should be note, however, that ATSDR has no evidence to indicate that phosphorus was analyzed for in private wells sampled in the area; phosphate was analysed for in a single private well, but not detected.

Comment #94: Page 103-108: Unlike the Executive Summary and Conclusions sections, there are no statements discussing how lead and arsenic in private and commercial well water are not site-related in Section 5.6, Exposures to Contaminants in Private Well Water.

ATSDR Response: ATSDR has acknowledged in other sections of the PHA that metals in the groundwater are not necessarily site-related. Nevertheless, because the concentrations of these metals were above CVs, we evaluated their potential health implications. To make it clear that they were evaluated because of public health concern and not because they were site-related, we have added text to the beginning of Section 5.6.

Comment #95: Page 147, Section 9.2.2., First Paragraph: ATSDR states: "Two commercial wells and one private well near the Stauffer facility contained arsenic that exceeded EPA's drinking water standard of 10 ppb. The elevated arsenic levels are not believed to be related to groundwater contamination beneath the Stauffer site." This is true. If the arsenic were related to the Stauffer site, there would be elevated levels of fluoride and phosphorus in the groundwater for these wells, and there are not.

ATSDR Response: ATSDR acknowledges this comment, but does not feel that any modification to the PHA is appropriate. ATSDR based its conclusion about the arsenic on (1) our understanding of the general pattern of arsenic contamination beneath the site, and (2) the hydrogeology and groundwater flow patterns at and near the site, NOT on the absence of other site-related contaminants in these wells. We agree that no elevated levels of fluoride were detected in the referenced wells (based on one analysis per well), but ATSDR has no record of any phosphorus testing in these wells.

COMMENTOR 2

The Board of Directors of Pi-Pa-Tag, Inc. compliments ATSDR on the thoroughness of their Public Health Assessment for the greater Tarpon Springs Community. We are attaching a copy of our Technical Advisors, Dr. Kevin Pegg & Mary Saunders, review of the subject PHA. Our Board, in their responsibility to this community, accepts the findings of ATSDR's PHA as well as the recommendations of Pegg & Saunders on the same PHA. We urge you to respond positively & act on their recommendations as follows:

1. **"That all potentially exposed & affected residents be included in follow-up studies to insure their safety & to establish a baseline for the long term effectiveness of the remedy."**

2. **"Since no one in the community has seen the recent ground water studies conducted by EPA & SMC, it is not practical to agree with or reject ATSDR's conclusions regarding the safety of the aquifer. Pegg & Saunders further recommend an "addendum to the groundwater PHA, using the most recent data."**

3. **"We recommend that Pi-Pa-Tag request an inclusion of a model study on references clarifying the changes to the slag that impacted it's toxicity in the course of distributing slag off site."**

4. **"We recommend the community decline to accept conclusions on the safety of area waters until adequate studies are conducted and an addendum to the PHA is provided."**

Comment #1:

Overview:

The "Public Health Assessment for Stauffer Chemical Company Tarpon Springs Pinellas County, Florida" dated April 2, 2003 is a comprehensive treatment of the existing data for this site. In contrast to previous Public Health Assessments (PHAs) for this site, which often used only a subset of data, or lacked a thorough discussion of alternative explanations, this PHA covers all known studies, provides new modeling studies, and uses data from other similar sites to form conclusions.

ATSDR Response: Thank you.

Comment #2:

Air route exposure studies:

A major concern of residents is the potential for persistent adverse health effects from toxins released during plant operations. Throughout most of the working life of the phosphate plant there were no air monitoring studies of any kind. In the last few years of production at SMC there were a handful of on-site studies using air samplers or particulate monitoring equipment. By itself the existing data does not allow conclusions on trends within the plant for many pollutants, or provide information on off-site exposure.

Using the available past information, plus historical prevailing wind meteorological data for the area, and more comprehensive studies performed at operating phosphate plants, the ATSDR performed computer modeling for potential adverse effects as part of this PHA. In essence they divided the potentially exposed groups into workers within the factory boundary, former Gulfside Elementary School children and workers at the school between 1978 and 1981 when the plant was still operating, and local residents within a few hundred feet of the plant. The PHA reached four conclusions:

On-site workers were exposed to potentially toxic levels through an air pathway;

Off-site Gulfside Elementary school workers and school children were likely exposed to significant, though infrequent, particulates and toxins through air exposure during the years the plant was operating;

Some local residents were exposed routinely to toxins at high levels; and,

At present there are should be no adverse airborne effects from particulates or chemicals emanating from the SMC site.

Recommendations in the PHA are that a toxicological commission study exposed workers (PHA page 151, section 10.8). However, the PHA also recommends against examining Gulfside Elementary students or workers for potential long-term effects (PHA page 11, third paragraph, last line "Therefore, ATSDR concludes that a scientific study of Gulfside former students is not appropriate at this time".). No mention is made of studies for exposed residents. This seems to be short-sighted. The commission should be free to examine effects for all affected groups, and if the potential for injuries is found then a health-effects survey should be expanded to include all groups.

The finding by the ATSDR that local residents had a history of past exposure to toxic levels of chemicals and particulates has implications for the cleanup. After the remediation there will likely be a minimal security barrier between the public and the cleaned site. The clean up levels proposed in the Record of Decision for this site are based on minimal residential levels—actually a commercial exposure scenario--presuming no prior exposure history, which is not the case for local residents. For the group of affected local residents it may not be possible to differentiate between exposure effects from after the cleanup, and exposure from site chemicals and particulates during site operations. Since the ATSDR has found that off-site exposure did occur these exposed subpopulations should be surveyed to establish a baseline for future exposure. Individuals should be considered and eliminated based on survey results, not arbitrarily dismissed in groups based on the property line.

ATSDR Response: ATSDR used all available information in assessing for potential exposures, possible adverse health effects, and feasibility for conducting follow-up public health activities. ATSDR does not believe that a scientific study of the community is warranted. However, former workers who are long-time community members could be eligible for a medical evaluation under consideration by ATSDR. As for a survey of the community, ATSDR has learned much in the past in conducting these types of surveys, including the inability to link adverse health conditions and disease to specific exposures. Because of the inherent scientific limitations in conducting these surveys, oftentimes communities were displeased with the surveys. ATSDR is not planning to convene a commission to discuss the feasibility of studying the exposed

community. However, much health information is contained in the PHA for an individual to discuss with his/her doctor.

Comment #3:

Off-site slag:

The PHA reviews several past health-effects studies on slag used in roads, road beds, foundations, concrete buildings, driveways and as fill. These studies sampled slag for chemical and radiological toxic exposure. The PHA affirms ATSDR's earlier assertions that off-site slag is not a threat to residents (PHA section 3.2.1).

Slag, a byproduct of the phosphorus refining process, was widely used locally. Loose slag used on gravel driveways or roads is a potential threat from chemical toxins and from radiological emissions. Slag used as fill or as roadbeds, or in concrete where the material is no longer available for direct contact, is still a potential radiological source. However, several studies in the neighborhoods found no levels of either toxic chemicals or radiological counts consistent with potential adverse health effects. Missing from the discussion is an adequate explanation as to why off-site slag is different than on-site slag in terms of a threat to the public.

It seems illogical that off-site slag is different than on-site slag when both came from the same source. However, it should be noted that slag is not uniformly toxic. On-site, highly toxic "hot spot" areas are dispersed throughout larger slag areas that are non-toxic solid waste. On-site the slag areas are feet-thick whereas off-site the slag is spread thinner, usually only inches deep, so that any toxic areas are further dispersed. On-site the slag has lain undisturbed since the site closed. Off-site slag was dug up, placed in trucks, dumped and graded—a process that helps disperse and dilute toxins below the levels that are considered harmful. The off-site slag is also subject to greater erosion and weathering than the large piles on-site. All of this may have served to mitigate current toxicity for off-site slag. The PHA provides only a brief and inadequate discussion of off-site slag on page 135 in response to residents' questions.

If the public is to accept the PHA's findings that off-site slag is only solid waste, and not a toxic threat, then the ATSDR should adequately explain in the PHA why this difference between off-site slag and on-site slag occurs.

ATSDR Response: With regard to the relative health hazards from on-site vs. off-site slag, the main issue is the gamma radiation dose rate that a person would receive from the slag. This dose rate is related to the amount of radiation emitted from the slag which is a function of the concentration of radium in the slag (pCi/kg) and the amount of slag present in a given area (kg/m^2). Although the concentration of radium in on-site and off-site slag could be similar, the amount of slag in a given area of the site, particularly in the northern portion of the site, is much greater than the amount of slag found in any similarly sized off-site areas, as noted in the above comment. Because there is much more slag on site than off site, and the on-site slag is confined to a relatively small area, the total amount of radioactivity emitted is much higher on site than off site. The result is that gamma dose rates on site (in the northern portion of the site) are orders of

magnitude higher than off-site gamma dose rates. Also, as pointed out by the commentor, the results from previous radiation surveys conducted in off-site areas where slag is present—such as driveways and roadways—indicated that gamma radiation levels in those areas were not a public health hazard.

Comment #4:

On-site soils:

The SMC site remains highly toxic. At this time the site is fenced and guarded, therefore, although the site is heavily contaminated it poses minimal risk to the community. The site description in the PHA is uniquely candid. Of particular interest was the ATSDR's shoreline survey indicating slag extending on the surface to the wetted portions of the shoreline along Meyers cove (PHA page 18, 2.2, third paragraph "It was observed that the riverbank was made of slag; erosion of the slag into the river was evident."). Additional surface soil samples from this area may be needed, and the area will have to be discussed in any Record of Decision.

ATSDR Response: ATSDR evaluated Meyers Cove using sediment sampling data collected during several site investigations. As shown in Tables 21 and 22 and Figure 8, and described in Section 3.2, and Appendix C (C.2.4), a number of sediment samples were collected adjacent to the site and within Meyers Cove. These samples were analysed for metals, fluoride, phosphorus, and radiological parameters. ATSDR considers these data sufficient for evaluating possible public health hazards associated with river sediments. ATSDR agrees that only a few samples (e.g., sc-sd-10, sed10, and sed7) were taken on or near the shoreline. Existing data do not suggest harmful level of contaminants in the Meyers Cove area.

Comment #5:

Groundwater:

According to the PHA the upper surficial aquifer is contaminated, although the lower Floridan aquifer is not. The PHA also states that the contaminated surficial aquifer may be used locally for irrigation at several off-site well points, however the net flow of the surficial aquifer is expected to be away from these wells. The PHA was completed before the most recent groundwater and geophysical studies. The community should request an addendum to the PHA using the final data, as it becomes available.

ATSDR Response: ATSDR has reviewed and incorporated newer groundwater study data into the PHA. Study data reviewed include

- Parsons Engineering Science, Inc. Final Groundwater Studies Report. Stauffer Management Company. Tarpon Springs, Florida. July 2004.

- O'Brien & Gere Engineers, Inc. Final Geophysical Studies Report. Stauffer Management Company. Tarpon Springs, Florida. July 2004.

Comment #6:

Comment: *Surface water/Anclote River:*

Studies on potential exposure through ingestion of seafood caught near the site remain deficient. Accordingly, no conclusions can be drawn. Regrettably the PHA makes the claim that seafood from surrounding water is likely to be safe, without basing the conclusions on any actual sampling data (PHA page 3, first paragraph "No fish or shellfish sampling data were identified in the site area"; which contradicts, PHA page 129, 7.1.7 "ATSDR has reviewed the environmental data from the Stuffer facility and none of the chemicals present at the site are at levels that might contaminate fish for human consumption.."). This is the weakest part of the PHA. Any and all conclusions regarding safety of local fin and shellfish stocks should be withdrawn by the ATSDR until proper scientific studies are conducted.

ATSDR Response: Environmental studies conducted to date have been sufficiently extensive to characterize the water quality in the Anclote River. Pages C-25 to C-33 summarize the two discreet sampling events and long term semi-annual monitoring that has occurred in the Anclote River over the past 15 years. ATSDR recognizes that past conditions (pre-1987) are not well documented. Additional sampling at this point in time would not fill this data gap. As such, ATSDR does not believe that further characterization of the Anclote River is necessary.

While no fish sampling data are available, ATSDR did review contaminants present in surface water and sediment within the river. ATSDR based its conclusion of the likely safety of local fish on the relatively low concentration and frequency of contaminants present in sampled surface water and sediment. From what is known about accumulation of contaminants in aquatic biota, it is not likely that contaminants present in the surface water and sediment have contaminated fish to unsafe levels.

In addition, when ATSDR evaluates sites where a food pathway might exist, the agency evaluates whether site-related chemicals are known to accumulate in edible portions of fish. Much information is available about chemical uptake into fish. Thus, so it is relatively easy to look at the list of chemicals found at a site to determine whether a food pathway might be a concern. Examples of chemicals that accumulate in fish include chlorinated pesticides, PCBs, and mercury. In reviewing the list of contaminants found at the Stauffer site and in the Anclote River near the site, no chemicals were found that are known to accumulate in the edible portion of fish. For this reason, ATSDR determined that sampling fish was not necessary.

Though not related to site releases, FDOH has issued a general fish advisory for the Anclote River to protect consumers from mercury hazards (Note: As noted in the public health assessment, this mercury advisory is not related to contaminants from the Stauffer site.) In the absence of fish data in this stretch of the river, prudent public health practice calls for following FDOH's fish advisory, limiting fish intake to one meal per week (adults), and one meal per month (children and pregnant/nursing women).

Conclusions:

The ATSDR performed a thorough Public Health Assessment for the Tarpon Springs community. The modeling studies and use of data from operating phosphorus refining

plants are the best approach possible for estimating effects after-the-fact. ATSDR site descriptions in this PHA were more candid than in previous documents. With four exceptions, discussed below, we recommend that Pi-Pa-Tag accept the findings of the ATSDR's PHA.

Comment #7:

Exception 1: We recommend the community request that all potentially exposed and affected residents be included in follow-up studies. According to the PHA only past workers are to be discussed in a conference related to potential long-term effects. However, elementary school children and retiree-aged local residents were also exposed. These sensitive subpopulations may well show a different pattern of injury than site workers that were primarily healthy males between ages 20 - 40, a group that is generally hardy. The proposed conference seems highly biased, even inequitable, since the clouds of toxins and particulates did not stop at the fence boundary. Individuals, not groups, should be surveyed both to ensure their safety and to establish a baseline for the long-term effectiveness of the remedy.

ATSDR Response: ATSDR designed the Expert Panel meeting according to the findings of the new PHA report, and because of exposure/scientific uncertainties associated with former workers who in all likelihood were the most heavily exposed to Stauffer related contaminants. The group's concern for other exposed populations is acknowledged by ATSDR.

Comment #8:

Exception 2: We recommend the Pi-Pa-Tag board request an addendum to the groundwater PHA using the most recent data, prior to accepting or challenging the groundwater findings in the PHA. Since no one in the community has seen the recent studies conducted by EPA and SMC it is not practical to agree with or reject the ATSDR's conclusions regarding safety of the aquifer.

ATSDR Response: See response to Comment #5.

Comment #9:

Exception 3: As presently written the PHA asserts that slag off-site is not a threat while slag on-site is toxic. The public should be provided an explanation for the differences between slag toxicity off-site and on-site. A considerable amount of slag is distributed throughout neighborhoods and the PHA does not make it clear why no threat is posed by this material. We recommend that Pi-Pa-Tag request inclusion of a model study or references clarifying the changes to the slag that impacted its toxicity in the course of distributing slag off-site.

ATSDR Response: See response to Comment #3.

Comment #10:

Exception 4: Any conclusions regarding the safety of the Anclote River near the former plant, and Myers cove, should be based on toxicological profiles of the area waters. Findings on seafood safety should be based on sampling of fin and shellfish tissues. Short-

and long-term ecological health should use real numbers. Studies cited in this PHA are based on very limited analysis, none of it recent, and many of the samples taken far from the site. We recommend the community decline to accept conclusions on the safety of area waters until adequate scientific studies are conducted and an addendum to the PHA is provided.

ATSDR Response: See response to Comment #6.

COMMENTOR 3

Comment #1:
Page I, paragraph 7 (groundwater samples) RE: "gross alpha, radium 226, and radon 222."

"Gross alpha"? We know that of the 12 contaminants of primary concern identified by the EPA and put into written form and distributed to the general public on May 31, 1996 at Gulfside Elementary School, many are alpha emitters. ATSDR mention of "gross alpha" in the shallow aquifer is not specific enough. Why hasn't analysis been done of those water samples to determine the CAUSE of the gross alpha problem in order to determine whether or not the percentages of different alpha emitters follow the same percentages as the Stauffer superfund site? There may be a secondary causative agent at work here and if there is we have need to identify it. "Gross alpha" as a description is inadequate -- the testing here is obviously not finished.

ATSDR Response: Consideration of contaminant sources is one of many considerations when evaluating exposure pathways. However, if ATSDR's review of environmental data reveals elevated levels of a particular contaminant, ATSDR focuses more on whether people are or could have be exposed to detected levels. While gross alpha radiation exceeded its CV in on-site groundwater, this water is not used as a drinking water source, and is therefore an incomplete exposure pathway. Identifying the levels and properties of contaminants detected in monitoring wells helped ATSDR to understand what contaminants, if any, could conceivably reach exposure points (e.g., nearby private wells). As discussed in earlier responses and in the PHA, site-related groundwater contamination has not affected off-site drinking water wells. It is beyond the scope of ATSDR public health assessments to attribute contamination to specific sources. Regulatory agencies (e.g., U.S. EPA) and others consider such factors when evaluating cleanup requirements.

Comment #2:
Page 1, paragraph 8, (Groundwater Samples Floridan Aquifer)
"...similar concentrations of arsenic and fluoride were reported in nested wells MW-9S and MW-3F, which are on the river shore down gradient of the main production area"

The above implies serious leaching into the Anclote River. Question is, what is the rate and amount of leachage both daily and yearly? Again, your work is not finished.

ATSDR Response: As discussed in Section 2.3.3.1.1 (Hydrogeology), groundwater in the vicinity does discharge to the Anclote River. Groundwater contaminants that were measured in the aquifers are not likely to have a significant impact on the Anclote River, particularly after

dilution once the groundwater enters the river. Further, the quality of the Anclote River was assessed in the PHA through the analysis of surface water samples. As discussed on pages 4 and 69, surface water samples from the river, especially those collected away from the site, did not show unusually elevated levels of contaminants.

Comment #3:
Page 2, paragraph 2, Gross Alpha and Radium 226 in private water supply wells.

Again, we need to know the CAUSATIVE AGENTS of the gross alpha being in the water. Given that the level is elevated and those who drink the water may be at serious risk. Further, even if that well-water was used to irrigate a vegetable garden the question begs as to whether or not the plant parts which are grown for human food will have absorbed any of the above radionuclides, thus passing body-burden on to those who ingest those vegetables for food? Without answering this question, local folks may be continuing to add to their body-burdens, thus further endangering health. What is ATSDR going to do about this?

ATSDR Response: Gross alpha radiation was measured slightly above its CV in only 1 of 36 samples collected from private wells, as indicated in Table 13, and in 1 of 22 samples collected from commercial wells, as indicated in Table 14. Alpha radiation at the detected concentrations and frequencies is not expected to cause adverse health effects and as such was not investigated further. As noted on page C-25, no radiological parameters exceeded CVs in the irrigation wells tested. Though the number of irrigation well samples is small, detected levels in other private wells were not at levels of concern. The maximum concentration of alpha radiation detected in any private wells (26.2 pCi/L) is not expected to accumulate in plants in sufficient quantities to cause adverse health effects. Consequently, ATSDR sees no need for further evaluation of the source of the alpha radiation.

Comment #4:
Page 2, paragraph 5, surface river water samples

The mention of Polonium 210 is very interesting. Polonium 210 is one of the contaminants found in elemental phosphorous slag used as aggregate in roads throughout this area of Florida. However, Polonium 210 has never been mentioned by EPA as a contaminant at this particular superfund site. However, given the prevalence of polonium 210 in the roads, this suggests that this element may indeed be a problem that has not been adequately identified. Again, neither EPA nor ATSDR seems to have followed through on something that might endanger human life and/or health.

ATSDR Response: As discussed in Appendix C, radium-226 and polonium-210 were only sampled for in Meyers Cove and at upstream locations. Radium-226 exceeded CV in nearly all surface water samples collected upstream, but only once in Meyers Cove. Polonium-210 was detected in most surface water samples for which it was tested [no CV]. Radium-226 was detected above CV in sediments in Meyers Cove and adjacent to the site. These contaminants were not sampled for elsewhere in the river. As discussed in Sections 3.2.3 and 4.1.4, the levels of contaminants detected in river surface water and sediment are not unusually elevated. ATSDR

has added text to Section 4.1.4 to more explicitly state its conclusion for this exposure pathway, that is, exposure to detected contaminant levels is not expected to result in adverse health effects.

Comment #5:

The Anclote River is utilized extensively by the general public for aquatic recreational purposes, for example fishing, swimming, boating, water skiing, and personal watercraft. Given that on warm weather weekends the Anclote River is almost gridlock from recreational overuse, and that extreme use extends from the Sponge Docks all the way out to and including Anclote Key, the question begs as to whether or not the folks who are out there recreating are being exposed to health hazards because of the Stauffer site contaminant leachate? This question must not be ignored because of the extreme usage of the Anclote River for recreational purposes. If there is even the suspicion of public health endangerment, the public deserves to be given notice via the news media ASAP.

ATSDR Response: As mentioned above, ATSDR evaluated concentrations of radioactive contaminants in sediment and surface water located in Meyers Cove and the rest of the Anclote River from available sampling data. Both surface water and sediment were tested for radium-226 and polonium-210 but only at two regions of the river for each medium (Meyers Cove and Upstream for surface water; Meyers Cove and Adjacent for sediment). Sampling data indicate that radium-226 was detected above its drinking water CV 33 out of 38 times upstream and only 1 out of 56 times in Meyers Cove and above soil CVs in nearly all sediment samples. Drinking water and soil CVs are used only for conservative screening methods, however, and these contaminants are not likely to cause adverse health effects based on the type of exposure expected during recreational use of the river. A more explicit statement has been added to Section 4.1.4 of the PHA communicating this conclusion.

ATSDR's public health assessment process does not evaluate or recommend specific remedial measures, per se. The public health assessment process is an exposure-driven evaluation that studies possible harmful exposures to people who might contact contaminated media and answers specific community health concerns. If health hazards are identified, ATSDR recommends measures to reduce or eliminate exposures. The Superfund process (independent of an ATSDR public health assessment), which involves a comprehensive review of health and environmental data, specifically evaluates the need for remedial action.

ATSDR encourages readers to visit "The Public Health Assessment Process and the Community," an interactive site on our Web site (http://www.atsdr.cdc.gov/training/public-health-assessment-overview/html/) for additional information regarding ATSDR's public health assessment process.

Note: Several human health issues are covered by this comment. They include contact with sediment during recreational activities, ingestion of river water during recreational activities, and eating fish and shellfish from the Anclote River. ATSDR evaluated these issues in the PHA.

Comment #6:
Page 2, paragraph 6. Meyers Cove, Radium 226 and polonium 210

The information in this paragraph begs to know the rate of leaching. We have proven that half of Meyers Cove was filled-in with Stauffer slag, so it comes as no surprise that you have found these radioactive contaminants. Locals have told you all about the "glow-in-the-dark" mullet which are bottom feeders and probably ingested the radium 226, and we also have told you about the mutant oysters (of huge size) occasionally found in Meyers Cove and nowhere else in this area of Florida. The elemental phosphorous by-product which is the "slag" is not just leaching into Meyers Cove, comprises about half of Meyers Cove. It is obviously a health hazard in and of itself. But how much of a health hazard is it making the Anclote River from that point westward to Anclote key and eastward with incoming tidal flow? Any WHY hasn't either ATSDR or EPA made effort to demand of SMC that Meyers Cove be remediated to its original, natural water-configuration, and get the dangerous slag out of there? If it isn't removed, it will continue to leach into the Anclote River forever.

ATSDR Response: Because ATSDR is not a regulatory agency, we have no authority to "demand" that Meyers Cove be remediated. Nevertheless, ATSDR understands that Stauffer Management Company does plan to remove the slag along the Meyers Cove shoreline when the site is remediated.

Comment #7:
Page 2 paragraph 8. Adjacent to Meyers Cove.

No wonder, the little upscale development called "Meyers Cove" enjoys its current land elevation due to years of wastefill being dumped there by Stauffer employees. There is some question as to whether or not Stauffer Chemical Co. knew that the employees were doing this, and there is question as to whether or not this was done by order of Stauffer Chemical Company, but the fact remains that it was done, and that is part of why the land part of Meyers Cove not only has a base of slag to worry about, but dangerous industrial waste directly from the plant. It would seem that there is a high probability that the folks living out there may be in harms way from the above. The degree of their health danger needs addressing by ATSDR.

ATSDR Response: Slag samples were not collected from areas within the Meyers Cove housing development. Still, slag data available for other off-site areas did not indicate the presence of contaminants at levels of concern.

Comment #8:
Page 3 paragraph 2, Fish and Shellfish

Given the number of trips ATSDR personnel have made to this area concerning the Stauffer Superfund site, the question begs as to why ATSDR did not collect and analyze samples of the fish and shellfish since the data ATSDR needs is not available through the Florida Fish and Wildlife Conservation Commission? Are ATSDR personnel so afraid of

the contaminants in Meyers Cove that they are afraid to do the skin diving for shellfish, and the wading necessary to catch fish in order to obtain the needed tissue samples? That is the public appearance and if that appearance sends a false message, ATSDR needs to say so and give an explanation as to WHY!

ATSDR Response: ATSDR does not generally conduct environmental sampling; rather, we usually rely on environmental samples collected by other groups and agencies in its evaluations. ATSDR can recommend additional studies to fill data gaps when data gaps are considered critical to evaluating public health concerns. While no fish data were available for ATSDR to review, ATSDR studied surface water and sediment conditions extensively to determine the potential for fish contamination.

Overall, the available data offer no compelling evidence that fish could be accumulating harmful levels of contaminants. In the absence of actual fish tissue data, knowledge about the concentration and characteristics of surface water and sediment contaminants can help predict whether harmful levels of substances might be expected to accumulate in fish. As discussed, few contaminants were detected at elevated levels in surface water and sediment. Many are naturally occurring and expected in marine environments (e.g., boron, sodium, and other elements) and are therefore not a public health concern. ATSDR did, however, examine other detected substances more closely. As described in Section 4.2.3 of the PHA, arsenic and fluoride, two of the more prevalent substances detected in surface water would not be expected to accumulate to harmful levels.

In summary, no one should be afraid to use the Anclote River for recreational purposes. The levels of metals and other chemicals that might have come from the Stauffer facility are not harmful; therefore, swimming or wading in the river is safe. ATSDR has added text to the public health assessment so that readers and the public will know that the river is safe for recreational purposes. As noted in the public health assessment, the Florida Department of Public Health has issued a health advisory recommending that residents limit the number of fish meals they have from fish caught in the Anclote River. This health advisory resulted from mercury contamination that is found in many Florida surface waters and is not related to contaminants from the Stauffer site. More information about Florida's fish advisory for the Anclote River can be found at http://floridafisheries.com/health.html.

Comment #9:
Page 3 paragraph 3 "breathing outdoor air"

"People working at or living near the Stauffer site during those times were exposed to airborne contaminants emitted from various plant operations and site activitites"

Exactly and specifically what were those emitted contaminants and what plant operations created them? Specifically the airborne contaminants.

ATSDR Response: Section 3.3 of the PHA provides a detailed analysis of airborne contaminants released during plant processes as well as a model analysis of the likely transport route and concentrations of those chemicals. Contaminants known to be released based on reported

emissions data required by environmental regulations include fluorides, phosphorus pentoxide, and sulfur dioxide. Other contaminants including metals, radionuclides, and inorganic phosphorus compounds were also likely released to the air; however, no estimated or measured data are available.

Comment #10:
Page 3 paragraph 6, soil - Gulfside Elementary School

RADIUM-226. It is not a surprise that the school soil is contaminated with a dangerous radionuclide. The dust from the slag-crushing operation directly across the road from the school, spewed such heavy dust that if driving a car one was forced to slow to between ten and fifteen mph because the thick dust thoroughly obliterated one's vision of the road. It was like driving in very dense fog. It is not surprising that some of that dust landed in the schoolyard. What is frightening is that those children who attended Gulfside are now marrying and having children of their own, some of which have severe birth defects. This suggests that the parents' inhalation of the radioactive dust may have been the cause. Only genetic testing can identify the culprit. Why isn't ATSDR doing it?

ATSDR Response: Ingestion was looked at as a potential pathway, but concentrations of radium were too low to cause adverse health effects. ATSDR is saddened and concerned to learn of reports of severe birth defects among the offspring of former students of Gulfside Elementary. A birth defect is the result of something that happens during gestation. For many birth defects, we do not know the specific causative agent (or combination of agents working together). For some birth defects, there has been identified causative agents called teratogens, these include certain medications, chemicals, alcohol use, and select infectious organisms. Studies suggest that age of the mother (over 35 years of age) and heredity (genetic susceptibility) along with some medications could play an important role for certain birth defects. For general information regarding Florida birth defects, please visit http://pewenvirohealth.jhsph.edu/html/reports/statefactsheets.pdf or the Centers for Disease Control and Prevention website at www.cdc.gov.

Comment #11:
Page 4 paragraph 1 Contacting off-site Slag

There is a problem here ATSDR does not even mention! When off-site slag is used in roads, it is crushed first at the plant and then used as aggregate in the materials which cap the road. As long as those other materials completely encase the slag particles there is no harm. However, when the road begins to breakdown over the years from wear, the slag dust containing radium 226 is released into the environment.

In this area, Stauffer Chemical Co. gave away slag to be used as paving material to anyone who wanted it. It often was used pristine as housepads and paving for driveways. In some instances, such as Bailey's Bluff, Stauffer Slag was used pristine as paving for entire housing developments. After about 20 years that slag begins to break down due to both natural use and the elements. (remember it is ferro-phos and the bacterium which speeds up the rusting process may be a heavy factor in that breakdown). Bottom line is that the

dust from the Stauffer slag can be dangerous if inhaled, and the dust created by the slag breakdown is growing in our community. The child that plays beside the driveway of his/her home may be at serious risk if that drive has been made of slag. What is ATSDR doing about that health hazard?

ATSDR Response: This community use of Stauffer slag was addressed in the PHA report with the information made available to ATSDR including the community investigation conducted in the vicinity of the Stauffer site. Generally, slag radionuclide levels were not at levels of health concern, and no adverse health effects from exposure to radionuclides in slag would be expected.

Comment #12:
Page 4 paragraph 2

Because of differences in tidal flow, the data you get from one sampling may be entirely different from that two weeks ago. Spring tides here are radical, and the effects are seen as much as five miles upstream. You would have to sample at all the tides for a full six months in order to reach a conclusion. I assume from this paragraph that ATSDR did not do so, nor has anyone else. Therefore, your data and the conclusions therefrom can be in question.

ATSDR Response: While conditions in the Anclote River do change as a result of the tides, extensive sampling of surface water has occurred, which has enabled a relatively comprehensive characterization of contaminants in the river. As detailed on pages 34 and 36 and Appendix C, samples have been collected in different seasons and over the course of approximately 15 years, thus providing an adequate amount of surface water data for a public health evaluation.

Comment #13:
Page 4 paragraph 3 Off-site groundwater.

People pretty much know enough now not to drink it. Question is, are they watering their vegetable gardens with it, and what is the vegetable uptake that humans might get by eating the vegetables thus watered? Remember the cesium at Bikini after Operation Crossroads and how the genetic pool of the Bikini natives was damaged because they ate the coconuts when they were allowed back after the Crossroads Atomic Bomb blasts. Some died, some got very sick, and there were overwhelming birth defects. That was from Cesium. My question is, "Does the water in those wells contain radionuclides that plants uptake?"

ATSDR Response: The only plant that bioaccumulates radium is the brazil nut. There are no garden vegetables that bioaccumulate radium

Comment #14:
Page 5 last paragraph Air Pollution from Stauffer and Page 6 paragraph 1 Exposure to particulate matter

It is unclear here whether you are referring to all particulates together as being a health danger due to ongoing severe irritation, or if you are referring to "particulates" as a group of site contaminants which are poisonous. Or both? The words "particulate-matter" appear to have three possible meanings throughout this document. Thus, the public is not certain what is meant in each instance the phrase "particulate-matter" is used. Please clarify.

ATSDR Response: The group of solid and liquid particles (called aerosols) in the air are grouped together to make up what we generally call particulate matter. The actual constituents of particulate matter and their sizes depend upon the source(s), weather, and other factors. Particulates in the air can be measured as a group depending on their size, or they can be analyzed further to determine the constituents of the particulate matter and their levels. Because we do not have reliable data to determine the actual levels of the constituents of the particulate matter in the vicinity of the Stauffer Chemical plant while it was operating, we have had to rely on the data that was collected for a group of particulate matter called "total suspended particles". This measurement provides an estimate of the levels of all particulates in the air. Using these measurements and estimates of the levels in air of other groups of particulate matter (such as PM_{10} and $PM_{2.5}$), ATSDR was able to compare the levels of particulate matter measured at the Anclote monitoring station to the levels that have been associated with adverse lung and heart health effects in the scientific literature.

Comment #15:
Page 10 last two paragraphs Gulfside elementary students

At elementary school age, most children still put inappropriate things into their mouths including their own dirty hands. That hand-to-mouth pathway pretty much ensured that the Gulfside Elementary students not only inhaled the radioactive dust, but ingested it also. Thus, we are saddened but not surprised by the birth defect problem. The Gulfside students who attended that school while the plant was running need desperately to be tested for all of the contaminants of primary concern that are radioactive which have been identified by EPA by May 31, 1996. There are twelve of them, an even dozen!

"The elevated radionuclide levels may have been associated with wind-blown dust from the Stauffer slag processing and loading operation which was directly across the street from the school".

ATSDR Response: Ingestion was looked at as a potential pathway, but concentrations of radium were too low to cause adverse health effects. ATSDR is saddened and concerned to learn of reports of severe birth defects among the offspring of former students of Gulfside Elementary. A birth defect is the result of something that happens during gestation. For many birth defects, we do not know the specific causative agent (or combination of agents working together). For some birth defects, causative agents called teratogens have been identified. These include certain medications, chemicals, alcohol use, and select infectious organisms. Studies suggest that age of the mother (over 35 years of age) and heredity (genetic susceptibility) along with some medications could play an important role for certain birth defects. For general information

regarding Florida birth defects, visit http://pewenvirohealth.jhsph.edu/html/reports/statefactsheets.pdf or the Centers for Disease Control and Prevention website at www.cdc.gov.

Comment #16:
That radioactive dust was back then and is now the most prevalent and severe of the Stauffer health culprits. The alpha-emitters which the body mistakes for calcium and which lodge in the soft bone, usually in the sternum and soft bone. The emissions from the alpha radionuclides thus lodged assault the tissue of the lungs and it is that constant irritation over years which causes cancer of the lung. This process can take 25 years or more to mature, but usually it is accomplished in less time. Once those alpha radionuclides are thus lodged, unless they are found and surgically removed, cancer is certain. Unfortunately, the alpha disbursement in soft bone tissue is usually so broad that surgery is not possible: However, in some few cases the surgical option is possible and the individual's life can be saved. This is why the lack of timely and fully proper testing needed to be done as soon as ATSDR (and the local community) became aware that there was inhaled alpha contamination. The delay of years, which was deliberate, may indeed have caused lives to be lost. Shame on ATSDR.

ATSDR Response: ATSDR evaluated site-related information. ATSDR does not recommend body scanning for radionuclides for former workers; the specificity and usefulness of this medical evaluation is not well understood. Radionuclides are common in the environment and in our bodies—the sources of these radionuclides are many and typically at doses to humans well below levels of health concern. It is likely that former workers were excessively exposed to higher-than-background levels of radionuclides due to workplace-related dust exposures; however, ATSDR does not have adequate data to assess these past occupational exposures. A vast majority of these employees worked at Stauffer for less than 1 year which would have limited the amount of time that they were exposed to any radionuclide hazards. ATSDR advises former workers who may have concerns about their health to discuss them with their private physician.

Comment #17:
Page 12 paragraph 6 Screening of former Stauffer workers

This paragraph suggests that government responsibility ends with the screening process. Governments, county, state, and federal, when the plant was built, concentrated on ignoring the safety features which were law at that time. In 1954cCol. Stafford Warren's report at Berkeley notified the world of the health dangers of radioactivity and radioactive elements. He made public all that had been learned from the experiences of Hiroshima and Nagasaki, and also details of the atomic experimental blasts which were Operation Crossroads at Bikini in 1946. Col. Warren's report made headlines worldwide. From that point onward, Stauffer Chemical Co. and all agencies of the United States Government were responsible for knowing the dangers of radioactive materials to human health. Stauffer Chemical Company and all non-military/non-intelligence agencies and departments of the United States Govt. chose to ignore that information and continued to ignore these safety hazards, especially concerning situations which were labeled "defense

industry". Because of the above, there is little, if any, question that the United States Government does indeed bare moral responsibility far and beyond the health-screening process. The community is well aware that this is so, and it is cowardly of our government not to shoulder this their obvious responsibility. They helped Stauffer to break the law by "looking the other way" which means that they contributed heavily to the health problems of the former workers. The former workers as a group are not wealthy folks, most because of site related health problems have been kept from fulfilling their full potential financially, and they and their families have suffered. It is preposterous to believe that they will be able to afford state-of-the-art medical treatment without outside help once they are screened and diagnosed. ATSDR and Uncle Sam need to be honorable in this matter and step up to their responsibility by granting state-of-the-art medical help to those diagnosed who cannot afford the appropriate-to-their-diagnosis medical attention. Not to do this is dishonorable.

ATSDR Response: ATSDR evaluated available site-related data and considered the advice of external biomedical experts (Expert Panel meeting July 31, 2003). Follow-up activities or investigations for former Stauffer workers are being pursued by ATSDR as previously discussed. ATSDR will keep stakeholders informed about these feasibility assessments through the agency's practice of community involvement and outreach.

Comment #18:
Page 13 paragraph 7 mailings to former workers

Stauffer Management Company was told they would be taken into court if they did not give FDOH the full list of former workers and the social security numbers of those former workers. It was the secretary of FDOH who wrote that letter to SMC. In the end FDOH Office of Environmental Toxicology did do a mailing through Social Security, but without the direct intervention of our Congressman, Michael Bilirakis, that mailing would have been delayed by Social Security for nearly a year! It is now obvious that ATSDR has not interfaced with Social Security to trace the whereabouts of ALL of the former Stauffer workers. Further, it seems obvious that the IRS would also have valuable input. If ATSDR truly wanted to find all the former Stauffer workers, ATSDR could, but the appearance is that they did not want to go to the bother: Or worse yet, might it be that the workers ATSDR "could not find" are those who have suffered and are suffering the worst medically, and this is a partial cover-up?

ATSDR Response: ATSDR conducted a tracing of former workers in conjunction with the new public health assessment. Multiple data sources were used including the Social Security database for this tracing. The results of this tracing were shared with some stakeholders in July 2003 who attended the Expert Panel meeting. Following the advice of these experts, ATSDR is conducting a follow-up determination of vital status for former workers in support of the mortality study.

Comment #19:
Page 14, paragraph 2 education in the Greek language

Suggestion: There is an organization at St. Nicholas Greek Orthodox Cathedral in Tarpon Springs which has a philanthropic service organization called THE WOMEN

PHILOPTOCHOS. This organization reaches out to the entire Tarpon Springs community and does not limit its good deeds to the Greek community alone. They are the ones with the contacts. ATSDR would do well to interface with them on an ongoing basis concerning this matter. If ATSDR tells them what the goals are, they more than likely can help ATSDR find the best ways and people to get it done. Not to bring them on board is to do this the hard way.

ATSDR Response: ATSDR is committed to reaching the target populations in their preferred language. Data collected in our needs assessment process identified a Greek–speaking population. Additionally, at public meetings regarding public health activities related to Stauffer Chemical hosted by ATSDR in the Tarpon springs community, public requests for the availability of documents associated with the PHA describing environmental exposure at Stauffer Chemical Company in Greek was documented. ATSDR has an internal mechanism responsible for language translation, and can provide translated copies to interested stakeholders. We will add the Women Philoptochos organization to our mailing list to ensure that they receive the community updates and other related documents and encourage participation based on their interest and availability.

Comment #20:
Page 14 paragraph 8 "healthy habits for respiratory illness care…"

In this instance, ATSDR needs to interface with HOSPICE OF THE FLORIDA SUNCOAST headquartered in the Largo/Clearwater area. The direction of this organization can streamline ATSDR's path to this goal. These are the nurses, physicians and caregivers that have seen the worst that Stauffer has done, and who have hands-on experience as to how to cope. Their knowledge and expertise in this area should not be ignored by ATSDR.

ATSDR Response: ATSDR appreciates this information and will take this information under advisement for possible health follow-up activities.

Comment #21:
Page 14 last paragraph Education of Local Healthcare Providers

ATSDR needs to give an in-depth course concerning the care of patients who have lung disease (including cancer) and who have had prolonged and immediate exposure to the Stauffer radioactive slag dust. (ATSDR will find that in such cases the blood profiles will form a pattern of difference as opposed to those who do not have that radioactive dust as a causative agent.)

ATSDR Response: This thoughtful suggestion would aid the affected person and his/her family; however, this type of so-called assisted care is outside the scope of ATSDR. ATSDR does not know the magnitude of this problem in the affected population, and there is little information for ascertaining this possible lung condition. ATSDR will check for local resources which might be able to address this concern. Furthermore, ATSDR is developing health education materials that might address aspects of this person's concern.

Currently, our health education effort is focused on former workers and local health care providers. Our next steps include health education and promotion activities for former workers who could have been exposed on-the-job to airborne chemicals during plant operations. We will provide environmental science and health resources such as case studies in environmental health, toxicological profiles, and ToxFaqs. We will provide information on taking patient exposure histories to increase efficacy in identifying respiratory conditions associated with environmental exposure via inhalation. Our goal is to increase the awareness of the local medical community about the current status of the site, contaminants of concern, and potential health impact to those who lived in surrounding communities while the Stauffer plant was in operation.

Comment #22:
Page 15, paragraph 1 Gulfside Elementary School - continuing health education

Numbers of birth abnormalities and defects are present locally in children of students who attended Gulfside Elementary School during the time that the Stauffer elemental phosphorous plant operated directly across the road was up and running. This is broad enough so that the community concludes that genetic testing needs to be done. Not only that, but those persons who are found to have a genetic condition which suggests the possibility of abnormal and/or malformed babies need to known, and they need ongoing genetic and psychological counseling. These folks are victims of both Stauffer and the lack of oversight and enforcement by State and Federal governments. Those who cannot afford such counseling should have it provided for by the Federal government. Why the FEDERAL government? Because Stauffer Chemical Company had sister elemental phosphorous plants all over the USA and the federal government turned a blind-eye in favor of those plants just as it did here. Thus, the matter crosses state lines.

ATSDR Response: This issue of birth defects was addressed above. For psychological counseling needs, ATSDR outreach activities have not shown this to be a concern among potentially exposed former students. If the commentor has additional information about this need, we encourage them to share it with the ATSDR site team who might be able to provide referral information for local counseling services.

Comment #23:
Page 122 5.8.12 Death Information for Former Workers (epi-stats)

What has not been said is that no matter what the cause of death, the inhalation of radionuclides in the slag dust, if retained in the body's soft-bones (or elsewhere in the body) does indeed in and of itself weaken the immune system in many ways. Thus, such a body would be much more prone than the average person to host pathogens, and that the result of such hosting would be more severe than that of the average non-exposed person. Not only is the body weakened, but the onset of genetically disposed illnesses will be sooner by years than they would have been, thus robbing the individual of part of his/her elder years. Thus, the cause of death may be pneumonia, for example, but in such individuals death may occur where in normal folks that death would not have occurred. Pneumonia may be the actual pathogenic cause of death, but the secondary (and more important) cause would

be inhalation of radioactive slag dust resulting in the permanent bodily retention of radionuclides.

ATSDR, in the light of the above, your epi-stats are not complete, and to present them to the general public as being complete is deliberate deception. You have presented a half-truth while implying that it is the whole truth. Is this an attempt by ATSDR to protect Stauffer? That's the way it looks to this community.

ATSDR Response: Cancer data was provided by the State of Florida. This data was current and complete according to national cancer surveillance accreditation guidelines. ATSDR used commonly accepted methods for analysis. ATSDR further investigated the incidence of mesothelioma. Outside experts reviewed these cancer risk estimates for postulating underlying causes or risk factors. Their comments were taken into consideration in finalizing the PHA report. For some diseases or health conditions expressed by the commentor (i.e., pneumonia), there is no state or regional surveillance program that would allow ATSDR to obtain data to make valid comparisons and interpretations.

Comment #24:
Page 137 7.6 Health Studies Concerns.

At death the individually legally loses certain rights. One of those rights involves that the individual has died. This community has pled with ATSDR for the ongoing list of former Stauffer workers who have died. Our request has been consistently denied. That denial is a barbarism against this community because there is no legal impediment to ATSDR's releasing of those names. Again, the appearance is that ATSDR is in collusion/protecting the Novartis megaconglomerate which is the great-granddaddy parent of SMC which is the PRP as identified by EPA. And because of the consistency with which EPA has publicly lied to this community, in public ATSDR meetings, we conclude (erroneously or not) that the whole United States Government is hell-bent on protecting the above megaconglomerate at our detriment. If ATSDR wants to turn around that community perception, it can start by showing some humanity by giving us a list of our dead.

ATSDR Response: In accordance with agency policy, ATSDR does not release the names of private individuals in ATSDR reports.

Comment #25:
Page 138 4. How do we get NIOSH involved?

As of 1996 the International Chemical Workers Union (ICWU) headquartered in Akron Ohio was nationally represented by one Rich Uhlar. Mr. Uhlar was/is a personal friend of David Sundin who held a very high position until recently in NIOSH. The ICWU (now defunct as a stand-alone union) was a "sweetheart" union. The ICWU worked just as hard to protect the chemical companies as it did to protect the workers, a situation in which the workers routinely got short-shrift. The close friendship between Uhlar and Sundin ensured

that NIOSH would do nothing that might put evidence of the wrong-doings of the chemical companies into the hands of the workers, including medical evidence. That is why NIOSH has refused to get involved, NIOSH is actively protecting the chemical companies, and in this instance we have the close personal friendship and constant contact between Rich Uhlar and David Sundin to prove it. Hear this C.D.C.; clean out and clean up NIOSH before you involve NIOSH with us. If you don't do that housecleaning, then we here will be used very badly by NIOSH for the benefit of Stauffer, the PRP and the PRP's parent, the Novartis megaconglomerate headquartered, last we knew, out of France!

ATSDR Response: A representative of NIOSH reviewed the draft PHA report and participated in the ATSDR-convened Expert Panel meeting (July 31, 2003). ATSDR appreciates the input of NIOSH and will continue to consult with NIOSH as appropriate.

Comment #26:
Page 153 11.3 proposed May 2003 meeting in Atlanta (workshop)

The character of those who are chosen by ATSDR to participate in this workshop is of profound interest to this community.

4 to 5 Environmental Experts

> **Neither any of those experts nor any of their family should ever have worked for any chemical company in any capacity whatsoever. Nor should there have been any family connection whatsoever with any of those chemical companies or parent companies, affiliates and subsidiaries included. Nor should any of these experts have any financial holdings in the chemical industry, related pharmaceutical industry, pesticide industry, or the genetic engineering industry. (All the above industries are inter-related through The American Chemistry Council, formally known as The Chemical Manufacturers Association - the old CMA). The ACC functions somewhat as a cartel - usually what one member knows, all the members know.**

ATSDR Response: Experts were sought and invited based on credentials, experience, and distinguished careers. Some were nominated by nationally recognized experts in pulmonary medicine. ATSDR was pleased with the participation of these eight experts.

Comment #27:
Former Worker

> **The most articulate and knowledgeable of the former workers are those who brought suit. Of those seven, four or five are still alive. It is to them that ATSDR should turn for testimony.**

ATSDR Response: Although the Expert Panel meeting was a scientific forum, two former workers were invited to attend this meeting, but both declined the invitation. ATSDR was pleased that the families of two former workers were able to participate in the meeting (either in

person or via telephone). These family members provided comment for the meeting's administrative record (meeting transcript).

Comment #28:

Community Representative

> **Mary Mosley has been working on the Stauffer project here for over 25 years! Her ability to speak extemporaneously will serve the workshop well. She knows more about Stauffer and it's history than anyone else in Tarpon Springs. Without her, there probably would have been silence. This community is heavily in her debt. She has earned the right to be the community representative.**

ATSDR Response: Thank you for this suggestion. Note: ATSDR did invite Ms. Mosley to attend the Expert Panel meeting that was held on July 31, 2003.

Comment #29:

Area Physician

> **Dr. Leonard Dunn of Dunedin, Florida has handled a number of terminal lung cases that were Stauffer related. He can give good testimony. Dr. Frederick Roever of Tarpon Springs has been vocal about the Stauffer health related problems, and he has been in practice here for decades, and he has earned great respect from his brother physicians at our local Helen Ellis Memorial Hospital. It would be advantageous if both these physicians attended.**

ATSDR Response: Thank you for this suggestion. ATSDR invited Dr. Dunn to the Expert Panel meeting; unfortunately, he was not able to attend.

COMMENTOR 4

Comment #1: I would like to thank the Agency for Toxic Substances and Disease Registry (ATSDR) for the greatly improved Public Health Assessment (PHA) and the information regarding Victor Chemical Works and Stauffer Chemical Company. The new PHA was obviously produced by caring and knowledgeable parties.

ATSDR Response: Thank you.

Comment #2: Much of my comments were provided in last month's extended submittal, but I welcome the opportunity to add the following.

Although monitoring was conducted and noted to have attained hazardous to your health levels, not once were the elderly, children or residents alerted by Pinellas County to remain indoors during dangerous levels of sulfur dioxide (p 77).

ATSDR Response: Comment noted.

Comment #3: Children attending Gulfside should be included as "people who lived or worked within 1,540 feet from the kiln" since the conflicting measurement was exceeded: (a) children are far more susceptible than adults and, (b) the elementary school was often described by the media and others as, "sitting in a cloud of smoke." The schoolchildren exercised and played under the great belching stacks of Stauffer arid the ground emissions. Windbome dusts had to be on their hands, their desks, and on their food. Gases, as well as dusts were inhaled into young lungs.

ATSDR Response: Even though Gulfside Elementary School was across the street from the Stauffer fence line, it was still more than 2500 feet from the kiln—the major source of sulfur dioxide and fine particulate emissions from the Stauffer facility. Unfortunately, no air monitoring data were collected at the school itself; therefore, ATSDR had to use a computer model to estimate contaminant levels at the school. The computer model was able to estimate air levels at the school for sulfur dioxide from all sources, but not for particulate matter. These discrepancies make it difficult to determine the exact health hazards that the students might have experienced from 1978 to 1981. It is reasonable to assume that the students were exposed to sulfur dioxide at levels that might have caused some adverse effects to their lungs as described in the public health assessment. It is more likely that these possible heart or lung effects were of short-term nature, meaning while exposure was occurring; long-term health effects were unlikely. ATSDR is unable to make any other conclusions about potential adverse health effects that Gulfside students may have experienced as a result of their exposure to airborne contaminants from the Stauffer plant.

Comment #4: Pinellas County failed to place a monitor near or on the school grounds to ensure young children were not being exposed to contaminant levels exceeding safe levels. The "safe" levels of today are being reduced as science's understanding increases. The most prevalent reason given by ATSDR for not conducting a study has been "lack of data." Assuming this statement to be true, Pinellas County must totally accept the burden of failing to monitor and protect the most vulnerable members of our society.

ATSDR Response: Comment noted.

Comment #5: Hazardous solvents which were used in great quantities at the chemical plant may not have been sufficiently considered.

ATSDR Response: While ATSDR did not perform a transport evaluation of each solvent used in past chemical processes, most soil and groundwater samples were tested for a full suite of volatile and semi-volatile organic compounds. The intent of such sampling was to identify any releases of solvents from past operations to these media. ATSDR, therefore, considers available data sufficient to evaluate potential releases from past site operations.

Comment #6: The PHA is most impressive. The only conclusion which I take issue with is the "prevailing wind" blowing Stauffer's contaminants away theory. Florida's climate has many "dog days" of summer where at times, winds may exist at four thousand feet, but not a breath of air may be detected at ground zero which resulted in much of the chemical plant's emissions remaining at ground level or to plume downwards. It can be clearly seen in the color photos taken by Gayle Boone and provided to ATSDR, the production of Victor Chemical Works and Stauffer Chemical Company for thirty five years produced great clouds of fugitive ground emissions that were not elevated by stacks nor could this huge amount of the plant's emissions sent through the poorly efficient scrubbers. The haze produced by the plant exposed employees to dusts and gases, engulfed the school, and hung over much of the community. A large mist was also released into the air at the end of every processing cycle when phossy water entered the disposal ponds. Phosphorescence may have been a part of production increasing exposure to radiation.

ATSDR Response: This comment primarily addresses ATSDR's interpretation of the meteorological data for the Stauffer site. When preparing the PHA, ATSDR obtained three very large sets of meteorological data collected in the vicinity of the Stauffer site. As Section 3.3.3 of the PHA indicates, we obtained 18 years of meteorological data from PCDEM's Anclote Road Station, 54 years of data from Tampa International Airport, and 30 years of data from St. Petersburg–Clearwater International Airport. All three stations observed meteorological conditions with devices placed 10 meters above ground surface—not at elevations thousands of feet above ground level. Combined, the three data sets provided ATSDR with more than 500,000 observations of hourly meteorological conditions.

As Figures 9, 11, and 13 in the PHA show, the prevailing winds observed at all three monitoring stations is clearly from the northeast to the southwest, and winds blew from south to north (i.e., from the Stauffer plant toward Gulfside Elementary School) less than 5% of the time. Thus, an extremely large volume of data supports ATSDR's conclusion that winds consistently blew Stauffer's air emissions away from Gulfside Elementary School. Not shown in the wind roses is the fact that the meteorological data sets we obtained indicate that calm winds occurred at the three stations approximately 6% of the time. During these times, air emissions likely did not disperse effectively and tended to remain near the source.

To address this comment, ATSDR revised the PHA Summary to acknowledge that air emissions from Stauffer could have affected air quality at Gulfside Elementary School, but these impacts would be limited to the relatively infrequent times of southerly winds and calm winds. ATSDR did not change the PHA conclusions as a result of this comment; the conclusions were based largely on an air modeling analysis that explicitly considers the impacts of southerly winds and calm winds on air quality at Gulfside Elementary School.

Comment #7: Proper education of the area's physicians to industrial diseases resulting from exposure to the Superfund Site should become a top priority and conducted by unbiased and qualified parties. The former education presentation was very poor and very lacking.

No one can know what adverse health affects may have occurred to susceptible children who were exposed to the harmful contaminants released by the former chemical plant(s) for so many years without conducting a health study. Until recently, the ATSDR appeared to be in agreement that a study was warranted - that sufficient evidence did exist. I can only hope that ATSDR will reconsider their most recent conclusion and that a study will be conducted of the children who attended Gulfside Elementary School from January 1978 - November 1982.

ATSDR Response**:** ATSDR acknowledges the importance of this concern of child health. The scientific literature provides clues as to the types of possible adverse health impacts some of these children might have experienced; namely, respiratory related signs, symptoms, or exacerbation of airway disease (e.g., asthma). As noted above and in the PHA, computer modeling was done for sulfur dioxide and for all sources. These computer-estimated exposures do have uncertainty associated with them. Because adequate exposure data does not exist for the school population, a health investigation cannot be designed and conducted by ATSDR that would yield definitive or valid findings. Moreover, the environmental data for the school indicate that students were likely exposed, on average, to levels of contaminants that would not produce long-term health effects, nor health effects that could be accurately assessed today using the state-of-the-art epidemiological methods. For this and other reasons stated in the PHA, ATSDR believes it would be inappropriate to conduct a health study of former Gulfside students. ATSDR is cognizant of the precautionary principle of "do no harm"; a health study based on poor or insufficient personal exposure data could produce misleading results.

COMMENTOR 5

Comment: As an employee of Gulfside Elementary for 16 years, I am most concerned for the students who were exposed on a daily basis to all these chemicals. I was diagnosed with chronic obstructive pulmonary disease (COPD) and never smoked or lived in an area where I could have been exposed to chemicals leaving only my work area at Gulfside. These children should have been tested, at least the ones that could be found.

Activists in the area have been fighting for the people for years to no avail. I am very old and know that I had no knowledge of what I was breathing nor did teachers, students, or families in the area. Now that we know, it seems the only concerns are not for people but the expenses to Stauffer to clean up the site. Human life should come first.

I would also like all the information regarding the chemicals I was exposed to so that I may give them to my lung specialist to review and possibly help in my treatment. He has been following all the newspaper articles written recently in the St. Pete Times. Any further information I can have I would appreciate.

ATSDR Response: ATSDR is sending a copy of the public health assessment to the commentor so that he/she can give it to his/her doctor. It lists the chemicals found at the site, describes those that might have been released from the Stauffer facility, and provides ATSDR's conclusions about the public health significance of past exposure to them. ATSDR hopes that the report is helpful to the commentor's doctor.

COMMENTOR 6

Attached please find comments from the University of Florida Center for Environmental & Human Toxicology. The Florida Department of Environmental Protection concurs with the comments.

I have read the draft Public Health Assessment for Stauffer Chemical Company (Tarpon Springs), Tarpon Springs, Pinellas County, Florida, EPA Facility ID: FLD010596013, April 2, 2003. This Public Health Assessment was prepared by the Agency for Toxic Substances and Disease Registry, and discusses possible historic, current, and future risks posed by chemicals on, or from, the Stauffer Chemical Company Tarpon Springs Site.

The report appears to be very thorough, presenting and evaluating information from a variety of sources. However, it contains some statements that are misleading, in my opinion.

Comment #1: The statements that were most striking to me involved a discussion of the toxicity of arsenic. A discussion of the potential non-cancer effects of arsenic begins on page 105, focusing almost exclusively on dermal effects. No mention is made of cardiovascular disease or other important potential' non-cancer effects associated with arsenic exposure. At the bottom of the page, with regard to arsenic effects on the skin, the report states, "It is important to realize that exposure has to occur for 10 to 40 years before damage to the skin occurs." This is inaccurate. Dermal effects from arsenic have been observed in children as young as two years of age in both the Antofagasta region of Chile and in West Bengal (see Arsenic in Drinking Water, NRC, 1999; and Arsenicosis in West Bengal, Sadananda Prakashani, 2002). Obviously, from these observations, 10 to 40 years of arsenic exposure is not required for dermal effects. The time to appearance of dermal symptoms is probably a function of arsenic dose, and it may well take 10 to 40 years in some individuals at certain levels of exposure. However, a blanket statement that 10 to 40 years of arsenic exposure is required for skin effects is clearly incorrect.

ATSDR Response**:** ATSDR agrees that the amount of time between arsenic exposure and development of skin disease is a function of dose, and that it takes decades of exposure to low levels of arsenic before visible signs of skin disease occur. ATSDR has modified to the PHA text to clarify this point.

Comment #2: A second statement that should be revised occurs in the discussion of potential cancer risks from chronic arsenic exposure. On page 107 of the report, it states, "Human studies of people exposed to arsenic in drinking water showed that a minimum of 20 years of exposure is needed before cancer can be detected in people. Most arsenic-induced cancers required 30, 40, and 50 years of exposure to drinking water." These statements appear to confuse latency with some sort of minimum exposure duration to produce cancer. Latency is the time interval between production of a critical effect by a

carcinogen and the appearance of malignancy. Several studies have estimated the latency period for cancer from arsenic (see Arsenic in Drinking Water: 2001 Update, NRC, 2001). Average latency in many studies is around 20 years, with some studies showing latencies up to 40 years or more. This is not the same thing as saying that 20 to 40 years of exposure is required to produce cancer from arsenic. Tsuda and others (Tsuda et at., Amer. 3. Epidemiol. 141:198-209, 1995), for example, found markedly elevated rates of bladder and lung cancer in a cohort in Japan with exposure to high concentrations of arsenic in well water for five years (1955 to 1959). There are also examples of cancer associated with arsenic in patients that used Fowler's solution for much less than 20 to 40 years. As with non-cancer effects, the minimum exposure period required to produce cancer from arsenic is probably a function of dose, but the relationship between dosing rate, duration, and cancer has not been well characterized. This uncertainty should be more clearly acknowledged in the report.

ATSDR Response**:** As discussed in ATSDR' response to the previous comment, the risk of cancer from drinking water containing such low levels of arsenic is a function of the length of exposure; as such, someone would have to drink water containing arsenic at the levels reported in the PHA for several decades before their risk of cancer would increase significantly. Conversely, someone who drank water containing arsenic at such levels for only a few years would not have a significantly increased risk of cancer. ATSDR has changed the PHA text to make this point more clear and to correct any confusing remarks about exposure and latency.