Part 3: Responsiveness Summary

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), which requires the United States Environmental Protection Agency (EPA) to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for remedial action. The Responsiveness Summary addresses concerns expressed by the public, potentially responsible parties (PRPs), and governmental bodies in written and oral comments received by EPA and the State regarding the proposed remedy for the South Minneapolis Residential Soil Contamination Site, Minneapolis, Minnesota.

Public Comment Period

A public comment period on the Proposed Plan for this Site was held from June 2, 2008 to July 1, 2008. As part of the public comment period, EPA held a public meeting on June 11, 2008. The Agency accepted both written and oral comments and questions at the meeting. Approximately 40 people attended the meeting. Approximately 7 comments were received orally at the public meeting and 9 letters with written comments were received by the Agency. Approximately 15 comments were submitted through email or's web page.

The next section contains a summary of the substantive comments received and the EPA's responses to those comments. Complete copies of all of the comments can be found in the administrative record.

Public Comments

Comments from General Public

Comment #1:

One commenter stated concern about the length of time required to complete the cleanup. One commenter stated that more crews should be added to shorten the time required to complete the work. One commenter stated that their child has lived in their home since she was two, and will be eight by the time the cleanup is complete. The commenter also said that she didn't think the investigation was completed efficiently and that studies from other sites should have been relied upon to make decisions at this site, instead of using time to replicate studies.

Response #1:

The timeframes estimated in the feasibility study are primarily developed to compare relative differences in remediation timeframes between alternatives. These timeframes should not be considered a final projection of remediation timeframe. A more accurate timeframe will be developed as part of the Remedial Design process and consideration will be given to methods to effectuate work as efficiently and safely as possible, given the constraints within the neighborhood (e.g., traffic flow, staging areas). We will certainly evaluate the best practices achieved during the removal action and look towards improving our methodology, based on lessons learned from the On-Scene Coordinator. The Agency's goal is to complete the work as efficiently, effectively, and safely as possible. Ultimately however, the remediation timeframe for a project like this will be governed by factors that will not be known until construction actually begins. These factors include weather, access to the properties, and resource availability.

Every effort will be made during the Remedial Design to identify ways to expedite the cleanup process. As noted by the commenter, the use of multiple crews may be a way to expedite the work. Part of the evaluation during the Remedial Design will be to determine the number of crews that can effectively and efficiently work within the site area. Experience gained from the Removal Program's work over the last 3 years has shown that there are limiting factors to the number of crews that can effectively work in the area. One such factor is the availability of space to store equipment. It has been an extremely difficult task locating space to store equipment during the removal process and they have used a small number of crews (3-5) to complete the 30 to 60 yards per year. The feasibility study has estimated that it may take 4 years to cleanup approximately 488 properties under Alternative 2C, or over 100 properties per year. While we think this is an achievable goal, it will require a great deal of space to accommodate the necessary crews. We hope to work with the City of Minneapolis, to identify, or make available, the resources needed to efficiently complete this work. However based on our knowledge of the area, its space limitations, and traffic congestion, we think that 4 years is a reasonable estimate to complete the work.

To the extent that we could, EPA used information gained from other sites, or programs, to develop a cleanup plan at the South Minneapolis Residential Soil Contamination Site. For example, the Agency has developed guidance documents like the August 2003, *Superfund Lead-Contaminated Residential Sites Handbook* which was used to develop the sampling plans and cleanup approach for this site. Knowledge gained from other sites did allow us to greatly focus the Feasibility Study and only look at alternatives that had a reasonable likelihood of succeeding. However, CERCLA and the NCP require the Agency to perform site-specific investigations, including a site-specific risk assessment. Every site has different circumstances, e.g., the type of contaminant, the extent of contamination, the media affected, property use in the area, and the population affected. For example, a cleanup selected for an arsenic contamination in a rural mining area may not be appropriate for a site in large city. In order to develop a cleanup plan that will be effective in addressing the risks posed by the site contamination, it is imperative to perform a site-specific investigation and analyses.

Comment #2:

One commenter suggested that EPA consider composted material to put on top of the "toxic dirt." They stated that it would be a "whole lot easier and cheaper, more pleasant, and less use of fossil fuels." They suggested that covering up the contaminated dirt would be preferable to taking out, and replacing, trees, shrubs and grasses. They wondered if stirring up the arsenic laced dirt into the air isn't a risky procedure in terms of people breathing it in. They provided a chapter from the *Human Manure Handbook*, by Joseph Jenkins to support the idea that applying compost to the soils would result in less bioavailable arsenic in the soil.

Response #2:

EPA evaluated technologies other than excavation and off-site disposal for this site. The details are contained in the Feasibility Study contained in the Administrative Record. One technology considered was phytoremediation with ferns. Ferns are known to take up arsenic from the soil. The ferns would be planted in contaminated areas and harvested. Ultimately, this technology was eliminated from consideration because of the length of time it would require to achieve cleanup standards, and the practicality of planting ferns across peoples' residential properties, and limiting other uses of the peoples front and backyards.

The literature cited by the commenter presents only information on the effect of composting on the bioavailability of lead in soils. No data was presented on arsenic bioavailability. However, assuming the technology would work on arsenic, it appears from the article that the technology still requires working the compost into the soil. It therefore has some of the same soil handling issues as the selected remedy of excavation and off-site disposal. The information provided also does not address whether the affect of composting on the material is permanent or if it is reversible over-time. It also does not address the volume of compost that would be required to effectively treat the soil. The concern is that bringing in excessive volumes of compost may adversely affect ground elevation and cause drainage and/or foundation issues. In addition, the composting effort would be very labor intensive, creating substantial worker exposures to arsenic.

EPA believes that excavation and off-site disposal is the only approach demonstrated to effectively and permanently minimize the residents' exposure to the contaminated soil.

Comment #3:

One commenter stated that this is "...a total waste of money, for a piece of ground that no one will use. The risks are so minimal. The expenditures of federal dollars simply reinforces the need for more government money. If the site is so bad how come people haven't been dying in the preceding years?

This is what happens when bleeding heart liberal democrats use their heart instead of their brain. Do alternative #1 and forget it."

Response #3

EPA respectfully disagrees with the commenter.

EPA performed a baseline risk assessment at this site. The baseline risk assessment is an analysis of the potential adverse health effects (current or future) caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action).

The risks posed by arsenic at this site exceed levels deemed to be considered safe (as established by statute and regulation). EPA generally describes risks in terms of probability or the specific chance of getting cancer. At this site, adults and children in the neighborhood currently have a direct contact exposure threat from the arsenic with a 1 in 10,000 (1×10^{-3}) probability of getting cancer. This level exceeds what Congress has deemed an acceptable health risk. Therefore, EPA is required by law to take an action. The commenter should also note that the properties we are cleaning up have a current and future use as homes for hundreds of people.

Finally, the risk assessment performed by the Agency looks at probabilities and does not do an evaluation of the state of people's current health. This program is only required to analyze potential current and future risks from contaminants.

Comment #4:

One commenter stated that their property is right on the edge of the site and no one has contacted them (e.g., called to discuss soil removal) and they do not know if their home is being considered for cleanup. Another commenter suggested that the Site be expanded to include all homes out to the Mississippi River.

Response #4:

The commenter should have received information from EPA throughout the RI/FS process. The Agency has continually reached out to the community to keep them informed about the cleanup, including the decision to limit the site investigation area to the air dispersion boundary. The Agency's mailing list has included everyone living within one mile of the former plant site. The Site investigation area is a ¾ mile radius from the pesticide manufacturing plant formerly located at 28th and Hiawatha. The intent was to include people outside of the area that was affected by the Site so they too would know the status of the Site. As a result, the mailing list includes approximately 10,000 properties. EPA has also held public availability sessions throughout the Site area at several times during EPA's involvement at the Site. Those meetings were announced through mailings, newspaper advertisements, and press releases.

EPA's authority is limited to the area that was impacted by contamination from the pesticide manufacturing plant known as the Lite Yard. While there may be properties outside of the investigation area with high levels of arsenic, the Agency's investigations show that the effects from the plant site (and so the scope of EPA's legal authority under Superfund) are limited to the area already investigated. The commenter's property is outside of the area that the Agency believes may have been affected.

While the Superfund Program cannot cleanup properties outside of our site investigation area we can work with the owners to identify ways to minimize the risks associated with exposure to the soils. A fact sheet can be found at http://epa.gov/region5/sites/cmcheartland/pdfs/fs_english_200605.pdf, which explains ways to reduce exposure to the contaminated soil.

Residential properties with elevated arsenic were identified in the Site area in all directions and across much of the Site. Statistical analyses provide some correlation with the CMC Heartland Site; however, the analyses do not indicate the CMC Heartland Site property is wholly responsible for all of the arsenic impacts, particularly the highly elevated arsenic results further removed from the CMC Heartland Lite Yard property.

EPA used the results of the ISC3 air dispersion model to estimate the extent of the impact the former plant site had on the surrounding residential area. The model results suggested that the plant likely impacted an area with an approximately ¾ mile radius. Sampling of all the residential properties within that area found decreasing arsenic concentration trends present in a few directions from the CMC Heartland Site. These trends are strongest at lower arsenic concentrations and the overall variability in the data limits the predictability of these relationships. This shows contribution of arsenic by the plant site property to the surrounding area. The site conceptual model, of arsenic contamination due to aerial dispersion, does not fully account for all of the relatively high concentrations of arsenic in all directions and distances which do not demonstrate directional or distance trends with the CMC Heartland Site property. The likelihood of intervening acts at many properties in the investigation area makes it very hard to evaluate statistical significance. Some of those acts (e.g., pesticide application) could increase surface arsenic levels, while others (tilling, sodding, and construction) could decrease surface arsenic levels.

Based on the results of the air dispersion model EPA believes that contribution from the facility is limited to the approximate ¾ mile radius area sampled in the remedial investigation and depicted in Figure 3 of the ROD. While the data did indicate some contribution from the plant site to the surrounding area, it does not support impacts beyond the area already tested. Therefore, the agency will not be expanding the site area beyond the current boundaries. While there is uncertainty, in some cases, about the levels of contribution from various sources of the elevated arsenic, the arsenic concentrations are present at levels that pose a human health risk and require some action by EPA.

Comment #5:

Several commenters said that they would like to see EPA select 16 parts per million as the arsenic cleanup standard for the Site. One stated that we need to safeguard as many people as possible and cleaning up 488 properties is not enough. They requested that we please follow Council Member Gary Schiff's recommendation that would have properties cleaned up to 16 parts of arsenic per million parts soil, affecting 631 properties.

Another commenter stated that they are concerned by the current clean up plan and do believe that the level of contamination that qualifies for clean up should be lowered, and additional yards should be cleaned.

Several commenters stated that they believe Alternative 3B should be selected. One stated that the fiscally responsible, long-term mitigation measure for this issue is Alternative 3B. The right solution is to permanently remove all of the soil with arsenic levels above 16 mg/kg at the South Minneapolis Soil Contamination Site. One said compromising this alternative will only put future generations at risk and create even greater expenses and mitigation needs in the long-term. They said their children and their children's safety are worth the extra investment to do it right this time. One commenter suggested that this would be an investment to lower hospitalization and health care costs related to the soil and air contamination. One commenter said that EPA's cleanup plan focuses on the long-term effectiveness and permanence of removing contaminated soil from their neighborhood. It is the most cost-effective approach to saving future generations from undergoing costly mitigation measures

Response #5:

The Agency acknowledges the comments, but based upon considerations of the requirements of CERCLA, the NCP, and balancing of the nine criteria, EPA believes that Alternative 2C, and a cleanup level of 25 mg/kg arsenic, is the most appropriate for the South Minneapolis Residential Soil Contamination Site. Alternative 2C provides the best balance of tradeoffs between alternatives with respect to the balancing and modifying criteria. EPA considers Alternative 2C the most cost-effective alternative.

The purpose of this response action is to control risks posed by direct contact with arsenic contaminated soil as a result of releases from the pesticide manufacturing plant formerly located at 28th and Hiawatha. Since no Federal or State ARARs exist for arsenic in soil, the preliminary remediation goals for arsenic were determined through a site-specific risk analysis and the final cleanup levels were selected based on risk management principles and the analysis of each alternative against the nine evaluation criteria, consistent with the NCP.

EPA believes the minimal risk reduction that might be achieved through a cleanup standard of 16 mg/kg versus one of 25 mg/kg is offset by other factors such as decreased short-term effectiveness, implementability, and increased cost. Along with an increase in the number of properties that would need to be cleaned up using 16 mg/kg as the cleanup

standard would come increased risk from truck traffic, increased risk of property damage, and increased risk to the cleanup crews. Also as the number of affected properties increases do does the difficulty in getting all of the property owners to agree to allow the cleanup. We do not believe it is cost effective to spend an additional 25% more on the remedy only to have a final cancer risk that is within the same order of magnitude as the proposed remedy and at the same time increasing the short-term risk, decreasing the implementability. In addition, the greater scope of excavation work adds two years to the project, significantly increasing disruption and inconvenience to the residents and creating additional project and waste transportation and handling issues.

The Agency believes that a full understanding of the risk assessment results and its uncertainties is necessary to understanding the risk management decisions that are being made at this Site. Table 9 from the Record of Decision summarizes the risk associated by various arsenic concentrations found at the Site. EPA generally considers people to be safe if the risk of getting cancer from contamination is as high as one in 10,000 (or $1x10^{-4}$), and as low as one in 1 million (or $1x10^{-6}$). As a measure of health impacts other than cancer, or non-carcinogenic risks, EPA uses what is called a hazard index. Generally, noncarcinogenic risks are considered unacceptable if the hazard index is greater than 1.0.

To ensure public health is protected, EPA uses worst-case, or "high-end" assumptions to determine risks. High-end estimates like these ensure that the actual chance of getting cancer will likely be below EPA's risk estimate. The level EPA considers "safe" is likely to over-state the actual human cancer risks. It's important to understand that the risk estimates are intended to provide the basis for EPA's decisions about cleaning up a site. They do not actually predict health outcomes.

The results of the baseline risk assessment for the Site indicate that existing conditions at the site pose an excess lifetime cancer risk as high as 6 in 1000 (or $6x10^{-3}$)from direct contact with arsenic contaminated soils. The soil arsenic background concentration of 16 mg/kg has a carcinogenic risk of 6 in 100,000 (6×10^{-5}) and a hazard index of 0.6. The selected remedy will address soil contaminated with arsenic in excess of 25 mg/kg which would correspond to an excess lifetime cancer risk of 1 in 10,000 ($1x10^{-4}$) and a hazard index of 1. Another way of looking at it is that soil contamination presents a (conservatively estimated) risk of 1 in 10,000 for arsenic concentrations of 25 mg/kg and of 0.6 in 10,000 for arsenic concentrations of 16 mg/kg.

Risk calculations are estimates built on a number of assumptions. Because of those assumptions, risk assessments have many uncertainties that have to be taken into account when the results are evaluated. Because of the types of conservative assumptions that were required to calculate the risks at this site, it is likely that this risk assessment has overestimated the risks, making the difference between 16 and 25 mg/kg even less significant. For example, the ability of the human body to take up arsenic, or be bioavailable, is an important input to the calculation. In this risk assessment, in the absence of any site specific data on bioavailability, EPA assumed that 90% of the arsenic in the soils is bioavailable. We assumed this because arsenic trioxide, as a pure substance, is very bioavailable. However, this material has been exposed to the

environment for 50 to 60 years and become weathered. It has likely become associated with other minerals in the soil, making it much less bioavailable. Other forms of arsenic, which are less bioavailable are also naturally present in the soil and part of the total arsenic concentrations being reported. Based on this it is reasonable to assume that the risk associated with 25 mg/kg is much lower than the $1x10^{-4}$ reported in the risk assessment.

Another factor causing overestimation of the risk is the assumption that a resident will be exposed to the contamination for 50 years. EPA's *Risk Assessment Guidance for Superfund (RAGS)* (EPA/540/1-89/002) recommends using 30 years when site specific data is not available, as is the case here. During the risk assessment process the Agency received a comment that a longer exposure period should be used because people may not live in the same house longer than 30 years, but they will live in the same general area for a longer period. The Agency decided to use 50 years instead of 30. The potential effect is an almost 60% increase in the calculated risk estimate.

One measure of the overestimation of the risk can be made by comparing the reasonable maximum exposure to an average, or central tendency exposure (CTE) risk for the same population. If the Agency were to base a cleanup decision on the average exposure scenario, arsenic levels as high as 119 mg/kg would fall within the acceptable risk range. This would indicate that by using the conservative assumptions in this risk assessment, risks to the average person may be overestimated by as much as 3 fold.

All of the factors that tend to over inflate the risk calculations will tend to minimize any potential risk difference between two arsenic concentrations. The calculated risks for 16 mg/kg and 25 mg/kg of arsenic are both within EPA's acceptable risk range and both are within the same order of magnitude..

This remedy will also address all soils deeper than 12 to 18 inches below grade contaminated with arsenic in excess of 95 mg/kg. Construction workers are the population most likely to be exposed to contaminated soils deeper than 12 inches. Arsenic concentrations of 261 mg/kg represent a hazard index of 1.0 and carcinogenic risk of $7x10^{-5}$ for construction workers. Resident exposure to high arsenic concentrations in deep soil is only expected in rare circumstances and only for short periods of time and less frequently than the construction worker. Any risks from exposure to arsenic contamination in the deep soil would be mitigated through the inevitable mixing of the deep soil with the clean, shallow soil, resulting in lower exposure point concentrations. Therefore, the acute exposure-based removal action level of 95 mg/kg, is considered appropriate and protective for the long-term. In terms of chronic, lifetime exposures, 95 mg/kg arsenic represents a chronic reasonable maximum exposure carcinogenic risk for residents of $4x10^{-4}$ and a hazard index of 4.0. This arsenic level represents a lifetime carcinogenic central tendency exposure risk for residents of $8x10^{-5}$ and a central tendency hazard index of 2.0. Again, these risks are mitigated by the inevitable mixing of clean shallow soil with the deep soil and the fact that chronic exposure to the deep soils is not a reasonable assumption.

Comment #8:

One commenter stated that the magnitude of this project makes it the opportunity to clean the Site to background levels. They said that EPA as the infrastructure in place and will be able to work through the implementations obstacle to a more thorough cleanup.

Their primary concern is the ability of the public to assess the cleanup proposals because it is not clear how the Agency selected 16 mg/kg as the background level for arsenic in the Site soils. They believe that 10 mg/kg should be used as background instead of 16 mg/kg because it represents the population of data that is "clearly background", instead of 16 mg/kg which represents the lower limits of the population that is a mixture of background concentrations and anthropogenic arsenic. They also stated that if EPA is not willing to use 10 mg/kg instead of 16 mg/kg then the Agency should explain the alteration of the "clearly background" figure in the written and oral presentations of its cleanup proposals to the public. The commenter questioned, "If readings below 10 mg/kg were identified as "clearly background," then why apply a reading for "potentially impacted" soil to establish the background level? And if there is a range of readings for "potentially impacted soil" from 10 mg/kg to 16 mg/kg, why choose the uppermost limit for the background level (why 16 and not 10)?" They also said that earlier in the project the Agency referred to lower concentrations, (e.g, "lower than 10") as background for the area. They said the difference in the background level alters the significance of the EPA preferred plan to remove "shallow" soil above 25 mg/kg (Plan 2C). They stated that the bottom line is that what appears to be an unreasoned inflation of the background arsenic level does not give citizens an accurate context in which to assess EPA cleanup plans.

Response #8

EPA respectfully disagrees with the suggestion that the "clearly background" arsenic concentration range, or 10 mg/kg, be used as the basis for the remediation goals rather than 16 mg/kg. The challenge at this site has been to identify the background concentration for arsenic in soils that have many potential sources of arsenic beyond the former plant site. Because of the numerous possible sources of arsenic in an urban environment like south Minneapolis, it was necessary to derive a background concentration based on a statistical evaluation of the available data.

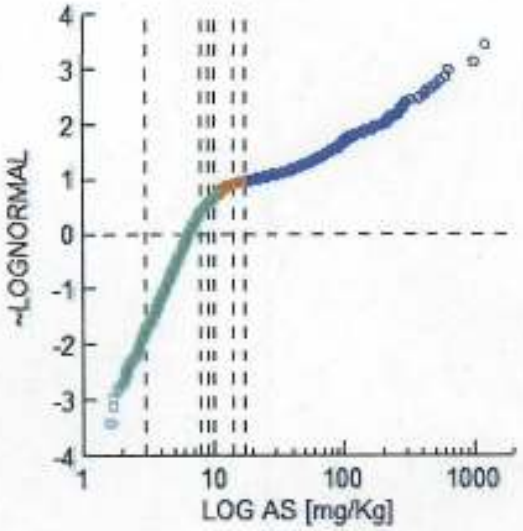
The commenter acknowledges that based on the statistical evaluation, discussed in more detail below, there are three populations of arsenic results at the site: 1) those that are clearly background, 2) those that are clearly a separate population, and 3) those that are mixture of the two. The question posed by the commenter is, should the Agency consider the mixed population part of the background, or not? Our evaluation of the data shows that the "mixed population" likely consists of levels that are not site related, i.e. background, but because of influences from other sources it is impossible to differentiate the populations at these levels. EPA believes it is appropriate, and consistent with Agency policy and guidance, to include the mixed population as part of the background population. Further, the risk assessment estimates the excess lifetime cancer risk from exposure to 10 mg/kg of arsenic at $4x10^{-5}$ which is not significantly less than the risk at

16 mg/kg of $6x10^{-5}$. Therefore, the Agency's decision on the selected remedy would not likely change even if the background concentration was dropped from 16 mg/kg to 10 mg/kg.

EPA's policy on handling background concentrations is discussed in the April 26, 2002 OSWER Directive 9285.6-0, *Role of Background in the CERCLA Cleanup Program* and also in the July 1996, *Superfund Soil Screening Guidance: User's Guide (Publication 9355.4-23)*. As the OSWER Directive states, "Generally, under CERCLA, cleanup levels are not set at concentrations below natural background levels. Similarly, for anthropogenic contaminant concentrations, the CERCLA program normally does not set cleanup levels below anthropogenic background concentrations." The Soil Screening Guidance states, the intent of this policy "is to avoid creating 'clean islands' amid widespread contamination".

To evaluate background concentrations at this site, a statistical analysis was performed using 7,519 surface soil sample results collected between 2001 and 2006. Probability plots graph the measured concentrations against those expected if the data (or the transformed data) are normally distributed. As a result, the data points tend to form straight lines when the data resemble a normal distribution (or when the log-transformed results resemble a lognormal distribution).

The figure below indicates several things. First, the arsenic data are neither normally nor log normally distributed. Next, the break in the plots suggests the existence of two distinct and different distributions. The set of color-coded green points corresponds to lower 'background' levels while the dark blue points indicate a population that is distinctly different, evidencing a flatter slope, limited to concentrations in excess of approximately 16-17 mg/kg. Points coded red suggest a region of potentially 'mixed' results, the range over which the highest background and the lowest contaminated results overlap. The subsets indicated in the arsenic probability plot correspond to arsenic levels from the minimum detected to 10 mg/Kg (preliminarily 'background'), concentrations in excess of 17 mg/Kg (exceeding background) and the intermediate concentrations greater than 10 mg/Kg but less than 17 mg/Kg, which are mixed points, overlapping the upper bound of background and lower bound of contamination.



The broken lines cut the x-axis at arsenic concentrations which correspond to literature values originally proposed by various parties for background arsenic concentrations at the site, including:

• Minnesota Department of Health (MDH)/Minnesota Department of Agriculture (MDA) determined background concentration of 4–5 mg/kg (Tetra Tech, 2005);

• US Borax investigation neighborhood background concentration of 7.15 mg/kg (Geomega, 2004);

• Background arsenic concentration of 12 mg/kg or lower (MDA, 2003); and,

• Morris Arsenic Dump background (Morris, MN) of 3 – 14 mg/kg (EPA, 2006).

We need to note here that the Agency's understanding of arsenic background at this site has been evolving over the course of our investigations. As at any site, as more data is gathered more is learned and the conceptual site model for a site is changed. Early comments regarding background were based on the best available information, which was limited. Having now sampled almost every property within the investigation area, we believe we now have a better understanding of the urban background levels of arsenic in soils.

The arsenic results less than 10 mg/kg (5929 results) represent the majority of available results. Background concentrations may actually be higher, but cannot be seen in the data because of the affect of site related contamination on the distributions.

Again, EPA's policy is to not clean up background concentrations of contaminants. In this case, the Agency has identified that the population of data with concentrations above 16 mg/kg is clearly not background. Therefore, the Agency has determined it appropriate

to use 16 mg/kg in the decision process instead of 10 mg/kg as suggested by the commenter.

Comment #9:

One commenter expressed their concerns regarding EPA's proposed clean-up of the South Minneapolis Neighborhood. As a resident homeowner, mother of a toddler and a landlord in this neighborhood, I have many reasons to be concerned. While there are financial implications for myself and my neighborhood if EPA does not implement an adequate cleanup, nothing concerns me more than the health of my daughter or the health of the child I am currently carrying. In EPA's May 2008 mailing on the proposed cleanup, you discuss under "Health Risks to People and the Environment" that the most direct way one can be exposed to arsenic is by getting dirt on one's hands and then touching one's mouth or accidentally swallowing contaminated soil. It has been very stressful to have to worry about whether or not my daughter is incidentally ingesting contaminated soil when we play outside in our yard or neighborhood park. It is very depressing to notify friends who are over with their children for playdates with my daughter that they need to take extra precautions at my home because my neighborhood has arsenic contamination.

I am concerned and confused as to why EPA has selected a cleanup criteria of 25 ppm arsenic when area background has been determined to be 16 ppm arsenic and the Minnesota Pollution Control Agency's (MPCA) cleanup criteria for residential neighborhoods in the state of Minnesota is 5 ppm arsenic (http://www.pca.state.mn.us/publications/risk-tier2srv.xls). The South Minneapolis Residential Soil Contamination Site is, as its name states, a residential neighborhood and it is, of course, in the state of Minnesota. I do not see any logical justification for a cleanup that is below the state-mandated risk-based guidelines of 5 ppm arsenic.

I am an environmental scientist at an engineering company and am aware of more stringent cleanup criteria imposed by EPA at other arsenic contaminated sites in Minnesota (e.g. the St. Regis Paper Company Superfund Site). My South Minneapolis neighborhood warrants as stringent a cleanup as other neighborhoods with arsenic contamination.

In addition to my concerns regarding EPA's proposed alternative, I feel that the analytical results clearly indicate that the site has not been fully or adequately characterized. EPA's proposed wind distribution model for contaminant migration does not explain the migration of arsenic contamination within the neighborhood when one evaluates the analytical results. The analytical results do not identify a decrease in contaminant concentration with distance from the source, and there does not appear to be an identifiable plume with concentrations that can be readily contoured. I feel strongly that additional samples need to be collected in order to characterize the site.

I am hopeful that the EPA will address the above issues in their continued evaluation of the site, and that the arsenic contamination in my neighborhood will be addressed in accordance with MPCA guidelines.

Response #9:

The Agency understands the great concern residents have about their children being exposed to the contamination in the Site area. Throughout the investigation and cleanups both the federal and state agencies have worked to provide the residents with the information they need to make the appropriate decisions to ensure their families are protected, and to cleanup up properties as quickly as we can. In 2004, shortly after becoming aware of the high levels of arsenic in the area EPA began performing soil removals at the properties with the highest levels. At the same time the Agency began community involvement activities to make people aware of the problem.

It is true that other sites in the country have used lower cleanup standards for arsenic. However, there are also sites in the country that have used higher cleanup standards. A quick review of cleanup levels used across the country shows cleanup levels as low as 2 mg/kg (Valley Wood Preserving Site, California) and as high as 300 mg/kg (Triumph Mine Tailings Site, Idaho). The reasons for the differences can be varied, but highlight the fact that site-specific circumstances are used to determine cleanup standards at Superfund sites. There is no federal cleanup level for arsenic in soils. Nor is there a consensus across states on what final cleanup should be. In some cases there may be a State that has a promulgated standard that may be used, but that is not the case in Minnesota. Minnesota's Risk Based Site Evaluation program also recognizes the need to use site-specific information to establish cleanup levels. The 5 parts per million standard cited by the commenter is the Minnesota Pollution Control Agency's Soil Reference Value SRV. As stated in the August 9, 2006, *Health Consultation, Off Site Soils: CMC Heartland Partners LiteYard Site,* prepared by the Minnesota Department of Health,"The SRV is a screening number and indicates a level of a contaminant that warrants further consideration." SRV's are not promulgated standards and are not intended to be used as final cleanup levels for sites. They are used to screen sites to determine if more studies should be performed.

Absent a promulgated standard, to select a final cleanup standard, EPA's Superfund Program must rely on site-specific studies, including a remedial investigation, a risk assessment, and the analysis of cleanup alternatives against the nine-evaluation criteria, as specified by the NCP. As discussed above in the response to Comment #8, EPA policy does not allow the Agency to cleanup to levels below background, which in this case is 16 mg/kg. Also, as discussed in more detail in the responses to Comments #5, EPA believes that 25 mg/kg is a protective cleanup standard provides and is the most appropriate for the South Minneapolis Residential Soil Contamination Site. Alternative 2C provides the best balance of tradeoffs between alternatives with respect to the balancing and modifying criteria.

Comment #10:

Two commenters asked the Agency to please cleanup the site and not to choose doing nothing. One stated that EPA has waited too long for action.

Response #10:

The Agency has worked as quickly as possible to cleanup this site. The site was brought to the Agency's attention in 2004 and it began soil removals that same year. This site has had some difficult technical issues to address before a final cleanup plan was selected, but we believe we have worked through those issues as quickly as possible.

Comment #11

Several commenters said they heard EPA will not clean up the arsenic contaminated soil around the community. They hope that isn't true for the children's sake and the future of the community. One commenter had great concern over the Agency not cleaning up the neighborhood. They stated that many lives, and the lives of many children, depend on the cleanup. One of the commenters wondered if we would choose not to cleanup the neighborhood if it was mostly white and wealthy. Another commenter stated that if this was a well to do neighborhood something would be done. They stated that it is detrimental to all the babies, children and families that live and work in the community.

Response #11

EPA believes the commenters have misinterpreted the proposed plan. EPA is in fact taking action to help protect all of the residents from the unacceptable risks posed by the arsenic contamination in the site area. This cleanup plan is based on the risk to children who live in the area. EPA has selected Alternative 2C which requires the cleanup of approximately 488 properties.

Comment #12:

The opportunity for the public to comment on the arsenic clean-up or lack of clean-up by EPA needed to have been widely publicized in a timely manner in order for EPA to have a comprehensive understanding of the public's concerns regarding this matter. Secondly, EPA's disregard for the health of the community in which the arsenic triangle is located is inhumane. Inhumanity, including preventive illnesses caused by toxic poisons such as arsenic, deteriorates the longevity and quality of life for all
human beings, not just low-income, people of color.

Response #12:

EPA respectfully disagrees with the commenter. The Agency provided adequate advance notice of the public comment period and made that announcement widely available in several different ways. The announcement of the proposed plan public comment period

and public meeting was mailed out to 10,000 recipients prior to the meeting and a notice was published in the Circle Newspaper on June 1, 2008. Also, an insert announcing the meeting was included in the June 2008 edition of the Corcoran newspaper. A press release was also sent out to all of the local news media prior to the public meeting.

The Agency has not disregarded the health of the community. When all of the cleanup work is completed approximately 700 properties will have been cleaned up. The Agency is cleaning up all soils that pose an unacceptable risk to all of the residents, regardless of race or income.

Comment #13:

One commenter said they've worked in the Phillips community for the past 10 years and lived nearby for 40+ years and has great concern for not cleaning up this community. The contamination is everywhere. They work and serve their clients many who live in this community. Many of their friends and relatives live and work here. EPA must keep cleaning up this area. Many lives and the lives of many children depend on this. We need a healthy environment for future generations.

Response #13:

EPA acknowledges the comment. The Agency is doing what it can under its authorities to cleanup the arsenic contamination in the area.

Comment #14:

One commenter stated that they like Alternative 3A, but it has to be accompanied by replacing any plants, shrubs, etc. They have put a lot of money into the landscaping of their yard.

Response #14:

EPA acknowledges the comment; however respectfully disagrees that Alternative 3A should be selected. As discussed above, the Agency believes that Alternative 2C performs best when evaluated against the nine evaluation criteria, and is the most cost-effective cleanup plan. The selected alternative, 2C, does include provisions for the replacement of plants and the restoration of the properties to their original conditions, to the extent practicable.

Comment #15:

One commenter stated that they have over 30 varieties of hostas that are 10-20 years old, as well as other unusual plants, mature trees (including evergreens with shallow roots) and a relatively weed free lawn (through hand weeding every year). Removal of 12 to 18 inches of soil would effectively destroy the award-winning yard and likely kill some of the mature trees (including elms which would be severely impacted by damage due to

Dutch elm disease). Values reported for her yard vary from 26 to 63 mg/kg. Contaminant levels in soils, especially those covered by vegetation and mulch are not usually a consumption risk except for unsupervised children who shouldn't be eating soil for other reasons. The proposed dirt removal remediation stirs up soil, and potentially creates airborne arsenic contaminated dust, a higher danger than inert soil. Is there a chelation solution less invasive and disruptive than soil removal? What is the trend? They suspect arsenic values are declining with time. Would resampling show something? Is there an opt-out since sampling was voluntary initially? What scientific resources can they use to obtain more information?

Response #15:

EPA will do what we can to minimize the disturbance to the property and to find a way to preserve the landscaping, to the extent practicable. However, the commenter is correct, that if excavation is necessary much of the landscaping may need to be replaced. This is the unavoidable reality if we hope to permanently cleanup the arsenic contamination. The commenter is also correct, that covering the contaminated soil with mulch or vegetation is one means of preventing exposure to the contaminated soil. However, that is a short-term solution. In order for such a remedy to succeed it would require constant maintenance into the foreseeable future. While the current owner might agree to maintain the cover, there is no guarantee that they would be able to, or that future owners would be willing, or able to do the same. In the end, while there will be some short term disruption to the landscaping, it is most cost effective to remove the soil from the property.

It is possible for dust to be generated during the cleanup. Part of the cleanup plan will require constant monitoring of dust using air sampling equipment. If at any time unacceptable levels are detected, measures will be employed to control the dust, such as wetting the soil during excavation or application of other dust suppressants. It should be noted that in the 4 years of construction at the site under the Removal Program, and constant air monitoring, the Agency has never detected unacceptable levels of dust.

There are technologies available that treat soil to bind the arsenic making it less bioavailable. However, those technologies are not appropriate for a residential setting. They likely would require mixing the soil with some type of amendment. So you would have the same soil handling issues as excavation. The technologies would likely take much more time to complete and would require long-term monitoring to ensure that the contamination remained bound to the amendment. Excavation and off-site disposal is more permanent, more easily implemented, and cost-effective than the on-site treatment that the commenter is suggesting.

Total arsenic levels would not decline with time. Arsenic is a heavy metal and does not degrade. The only way for levels to lower would be via mixing the soil with clean soil or other amendment, i.e. through dilution.

There is no "opt out" to the cleanup. EPA believes that it is important to cleanup every property to make sure that all current and future residents are protected from the potential exposure to the contamination. At some point others may live on the property and have different lifestyles that would cause them to have more in contact with the soil, or less willing to maintain a cover over the soil. The Agency believes the permanent solution of excavation and off-site disposal is the most appropriate for this area. If for some reason an owner refuses to allow access to EPA to complete the cleanup, the Agency may seek to put use restriction and/or other notices on the property to ensure others will not be exposed to the contaminated soil.

There are numerous sources of information on arsenic and the available cleanup technologies, including local universities. One very good resource is EPA's Clu-in web site located at: http://www.clu-in.org/contaminantfocus/default.focus/sec/arsenic/cat/Overview. The web paged contains basic background information on arsenic and links to documents covering many aspects of the cleanup process for arsenic.

Comments from Public Officials

Comment #16:

Councilman Schiff stated that cleaning to background and doing a more thorough job makes the most sense to mitigate against cumulative health effects that are known in the neighborhood from other environmental impacts. The length of time should be shortened by adding more crews to the work area.

Response #16:

The comment raises issues similar to those addressed above. The reader should refer to Response #1, Response #5, and Response #7.

Comments from PRPs:

Comment # 17:

The commenter stated that EPA continues to suggest that the former CMC Lite Yard Site is the source of elevated arsenic concentrations found on the SMRSCS properties that are subject to cleanup. Despite the fact that U.S.EPA's own data and statistical analyses cannot link the former CMC Lite Yard Site to concentrations of arsenic in residential soil above normal background levels, EPA continues to use disproven air dispersion transport assumptions in its selection of residential properties proposed for cleanup (i.e. properties with elevated concentrations of arsenic located within a 3/4 mile radius of the CMC Lite Yard Site). The commenter is concerned that some of EPA's comments are misleading with respect to the sources of arsenic contamination in residential soils at the SMRSC.

The commenter asserts that EPA continued to make allegations implicating the former CMC Lite Yard Site even after it published statistical data evaluations and modeling documents reporting contrary conclusions as to source. They presented the following quotes from EPA:

- "Arsenic concentrations greater than background may not be linked to the CMC Heartland Site."

- "...small scale variability is not negatively related to distance from the CMC site... these areas of small-scale variability may be indicators of alternative anthropogenic sources of Arsenic (e.g. pesticide application.)".

- "...this looks like a general problem with arsenic throughout the area that we can't tie back to the CMC plant, so we don't have authority to address anything outside that area."

The commenter stated that to date, EPA has collected and analyzed thousands of arsenic samples within the SMRSCS. However, no statistically significant evidence or link to the former CMC Lite Yard Site has been made. Moreover, it asserts that EPA's reports conclude that the underlying assumption of contaminant transport that formed the basis of the identification of the source area and SMRSCS boundary are not supported by the data. Therefore, the commenter felt that claims filed by EPA in the CMC Heartland Partners bankruptcy matter for $29.4 million associated with the SMRSCS are unsupported and without merit.

The commenter stated that the data collected to date and statistical evaluations conducted by EPA and its contractors do not support the governing conceptual site model and underlying assumption that the former CMC Lite Yard Site is the primary source of arsenic contamination to the SMRSCS properties that are subject to cleanup.

They asserted that these reports provide strong statistical evidence upon which to conclude that the former CMC Lite Yard Site is not the primary source of arsenic contamination to the SMRSCS properties that are subject to cleanup. The RI Report concludes that, "Arsenic concentrations greater than background may not be linked to the CMC Heartland Site." This statement has important ramifications because only properties with arsenic concentrations in soil significantly above background concentrations will be remediated under EPA's May 2008 proposed cleanup decision for the SRMSCS.

Expected Data Trends

The commenter stated that the statistical analyses performed by EPA and its contractor indicate that site data do not support the assumed conceptual site model (aerial deposition of arsenic from the former CMC Lite Yard Site to properties within a 3/4 mile radius), making the assumed SRMSCS boundaries arbitrary and inaccurate. The observed spatial patterns of arsenic concentrations in soil provide insight into the source. For example, if

the former CMC Lite Yard Site is the source of elevated arsenic concentrations the following data trends would be expected, but were not observed:

- Maximum arsenic concentrations decreasing with distance from the former CMC Lite Yard Site in all directions.
- Higher arsenic concentrations in primary downwind directions (northwest and southeast).
- An even distribution of arsenic concentrations in areas at similar distances and directions from the former CMC Lite Yard Site, i.e., variability should be present at a large scale, not varying widely from one property to the next.
- Arsenic concentration should not vary with property use. Schools, cemeteries, parks, and residential properties at similar distances and directions from the former CMC Lite Yard Site should be affected to the same degree.

If elevated arsenic concentrations are due to homeowner applications of chemicals, different trends in data would be expected, and were observed:

- A random pattern of elevated arsenic throughout the defined area;
- High small-scale variability in data (dramatic differences from property to property);
- The absence of elevated arsenic concentrations in non-residential soil;
- Arsenic concentrations increasing with home age (more time for buildup of arsenic in soil due to multiple applications of chemicals over time);

Support for Sources of Arsenic other than the former CMC Lite Yard Site

The commenter said the EPA's statistical evaluation of data and air dispersion modeling efforts provide several lines of evidence supporting sources of arsenic other than the former CMC Lite Yard Site. They stated the arsenic soil concentration data do not show the expected pattern of decreasing concentration as distance from the source increases. The absence of spatial patterns in elevated arsenic concentrations is inconsistent with the former CMC Lite Yard Site as the primary source of arsenic contamination to the SMRSCS properties that are subject to cleanup. The observed random scatter of arsenic in soil suggests that there are other sources contributing to elevated arsenic concentrations in the SMRSCS.

Moreover, the commenter asserts that if the former CMC Lite Yard Site was the source of elevated arsenic in the SMRSCS, one would expect that soil contamination show strong patterns of spatial gradients with distance and a correlation with wind rose frequencies.

However, there is a lack of concentration decay patterns in not only the primary downwind directions, but in all wind directions.

Distance is one of the major factors influencing airborne contaminant deposition and the magnitude of soil contamination from a source. If air dispersion from a source close to ground level were the primary transport mechanism, higher arsenic concentrations would be expected in closer proximity to the former CMC Lite Yard Site, rather than clustered at the southern-most extent of the study area as shown by the data. The CH2MHILL surface soil statistical evaluation concludes that the concentration trends are present in only some directions from the former CMC Lite Yard Site and the trends are weak with a high variability in the data limiting predictability of the relationships. In addition, the FIELDS air dispersion modeling report states that "small scale variability is not negatively related to distance from the former CMC Lite Yard Site, as would be expected if air-dispersion were a primary transport mechanism. Therefore these areas of small-scale variability may be indicators of alternative anthropogenic sources of Arsenic (e.g. pesticide application.)".

The RI Report suggests that a weak positive correlation between home age and elevated arsenic concentration is consistent with deposition occurring at these properties during the active period of manufacturing at the former CMC Lite Yard Site. This is not the only possible explanation. A positive correlation between home age and contaminant concentration is also consistent with a longer history of use of household or lawn chemicals. Note that a positive correlation between home age and lead concentrations in residential soil and dust is indicative of lead-based paint contamination.

A comparison of arsenic concentrations at residential properties to parks, schools and cemeteries corroborates this conclusion. The RI Report states that the sample results from the parks, schools, and the cemetery were within background levels (less than 10 mg/kg). The only properties where elevated levels of arsenic were detected are residential. As properties at similar distances and directions from the former CMC Lite Yard Site should be affected similarly, this result provides further support to the concept that the elevated arsenic concentrations are associated with household chemicals, rather than releases from the former CMC Lite Yard Site.

To summarize, the commenter states that EPA has admitted that it cannot link elevated arsenic concentrations (i.e., those that require remediation) to aerial deposition from sources at the former CMC Lite Yard Site. The proposed plan for the SMRSCS (the boundary for which is now shown to be baseless and therefore arbitrary) is to excavate and dispose of soil at concentrations of soil above 25 mg/kg in the first foot and 95 mg/kg at greater depth at an estimated cost of $17.9 million. Funds for these activities, while supported by the results of the risk assessment, cannot be justly recovered from the commenter.

Response #17:

EPA respectfully disagrees with the comment. The Superfund Program is based on the concept of strict, joint and several liability. Therefore, it is not necessary for the Agency to demonstrate that all of the contamination is from the plant site before taking an action and/or recovering its costs. EPA's statistical analysis of the sampling data makes a prima facie case that all or most of the homes requiring cleanup at the Site were contaminated with arsenic from the Lite Yard operations, even if other sources of contamination were involved, too. The facts and the legal standard place the burden on the potentially responsible parties to specifically demonstrate that contamination at certain properties is wholly unassociated with Lite Yard operations. For the reasons discussed in the ROD and in the Responsiveness Summary, given all the variables it would be extremely hard to make that demonstration. Strict, joint and several liability would therefore apply to the owners and operators of the Lite Yard, who would in turn have the right to seek contribution from other parties responsible for contamination at the Site.

The fact that the releases from the former plant site occurred 40 to 70 years ago, into a highly active residential area, was a complicating factor when trying to define the area of contamination. Disturbances to the area soils by residents, perhaps bringing in fill, turning soil, or even applying arsenic-containing materials, likely masks concentration trends that exist and would otherwise more clearly support EPA's conceptual site model. By using an air dispersion model EPA was able to define an area that may have been impacted by releases from the plant site. The model was based on the available information on the plant operations and the materials (arsenic trioxide) used at the facility. The results of the model predicted an area of about a ¾ mile radius might have been impacted.

We agree with the commenter that the arsenic concentrations detected in the residential properties are not wholly consistent with a conceptual site model based only on air dispersion, and it does appear that not all of the elevated arsenic concentrations in soil are solely attributable to the CMC Heartland Lite Yard operations. The occurrence of elevated arsenic in all directions, across much of the investigation area indicates some of the highest levels of arsenic, especially at greater distances from the CMC Heartland Lite Yard property, may also partially be the result of a property specific use or application (e.g. fertilizer or pesticide application, use of pressure treated lumber, on-property disposal of coal ash). However, when looking at the data as a whole EPA believes the former plant site is also likely the source of high arsenic levels seen throughout this area, and especially in close proximity to the Lite Yard. The trend analyses of all the data show that in the northwest, west and southwest directions there is a decreasing concentration trend moving away from the site, seen most clearly at lower concentrations. The decreasing trends are consistent with aerial dispersion from the former plant site.

Counter to what the commenter stated, the directions where we see decreasing trends are in the directions of the prevailing winds in the summer months when the plant was operating. While the conceptual site model suggests that air dispersion occurred primarily in the summer months when winds are predominantly to the northwest, there is a

component of the wind patterns that does blow to the southwest and southeast. It is therefore quite possible that arsenic from the site was dispersed to these areas. While the statistical analysis of the trend to the southeast does not seem to support the expected decreasing concentrations, this analysis is hampered by the absence of data within the first 1000 meters from the source due to redevelopment within that area. On the other hand, arsenic concentrations to the southwest do show a decreasing trend.

The likelihood of intervening acts at many properties in the investigation area makes it very hard to evaluate statistical significance. Some of those acts (e.g., pesticide application) could increase surface arsenic levels, while others (tilling, sodding, and construction) could decrease surface arsenic levels. In addition to the directional trend data, the fact that properties with homes built after 1960 predominantly have concentrations near background, supports EPA's conceptual site model. In approximately 1960, active shipments of powdered arsenic to the Lite Yard ceased. From that point on, air dispersion of the residual arsenic from the Lite Yard would have been more limited and more localized (to residences in close proximity). If common use of pesticides was the primary explanation for the residential arsenic contamination at the Site; we would expect to see elevated levels on properties from both the pre- and post - 1960 periods. However, we do not.

This all indicates that the elevated arsenic levels likely resulted from some source other than pesticide application. All of this information supports EPA's conclusion that the former plant site has caused elevated levels of arsenic in the soils of the surrounding areas, and that the area affected is limited to the current investigation area as defined by the results of EPA's air dispersion model.