



GENERAL MILLS

March 15, 2017

VIA EMAIL AND U.S. MAIL

Mr. Timothy J. Grape, PG
Project Manager
Site Remediation & Redevelopment Section
Remediation Division
MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: Former General Mills 2010 East Hennepin Site (the “Site”)

Dear Mr. Grape:

This letter responds to the Minnesota Pollution Control Agency’s November 28, 2016, letter, and demonstrates that General Mills’ remediation efforts have fully cleaned up the Site. Accordingly, no further response actions are necessary.

This letter consists of three parts: an Executive Summary, a discussion of the findings of the comprehensive review undertaken by two leading scientific experts, and our substantive response to the requests of the November 28, 2016, letter. Also enclosed are the expert reports with full technical substantiation demonstrating that the Site has been fully remediated.

I. Executive Summary.

The historical response action activities regarding the Site were based on the assumptions that General Mills disposed of solvent wastes containing large amounts of trichloroethylene (“TCE”), and that these solvent wastes caused all of the soil and groundwater impacts down gradient and cross gradient of the Site. That conceptual site model is demonstrably incorrect.

We have now identified the unique signature of the waste disposed at the Site. We know from data collected at and near the disposal area that this waste caused only a localized impact in soil and groundwater in the vicinity of the disposal area. Because the unique signature of this waste is no longer detectable in soils or groundwater --in fact, it hasn’t been detectable for decades-- we now know that General Mills successfully remediated the chlorinated solvent and

TCE soil and groundwater impacts associated with the disposal area to the action level by 1991 and to “non-detect” by 1996. The Site has been fully remediated.

These findings are the key to a new conceptual site model that MPCA must use to correctly and promptly address the groundwater and soil vapor caused by TCE sources up gradient of the Site. Most importantly, these up gradient sources are the cause of the persistent TCE in groundwater beneath the Site, and of TCE in groundwater and soil vapor in the Como neighborhood. If MPCA fails to adopt this new conceptual site model, there will likely be delay and waste of resources in addressing the impacts of the up gradient sources.

Because the Site has been cleaned up, nothing the MPCA does or learns in its expected study of the Southeast Hennepin Site can or will change these facts and conclusions. Therefore:

- The 1984 Consent Order and the 2014 RAP Modification No. 1 must be terminated;
- The Site must be delisted from the Minnesota Permanent List of Priorities and from the National Priorities list; and
- Responsibility for the installed base of vapor mitigation systems (“VMSs”), sentinel network monitoring and reimbursement of electrical costs must be transferred to the parties responsible for current TCE impacts, or to the MPCA itself.

Consistent with how it has responsibly addressed the Site over the last 30 years, General Mills recognizes that there must be an orderly transition of responsibility for any further response actions to MPCA and to the parties liable for the up gradient TCE sources. We are prepared to enter discussions promptly to achieve that transition and end our involvement in these matters.

II. Findings of Comprehensive Expert Review

Site Background. From the 1940s to 1962, small amounts of solvent waste from research facility were disposed in the ground at the south end of the Site (“the disposal area.”) In 1977, General Mills sold the subsidiary that operated at the Site. We reported this historical disposal practice to the MPCA in 1980. The first soil and groundwater investigations at the Site were conducted in 1981, making it one of the first on-site disposal sites in the country to be investigated under the Superfund regulatory framework. The environmental investigations revealed a large TCE plume in the Glacial Drift aquifer that was present at the disposal area and also southwest, down gradient of the Site.

Although some of the original investigation results were potentially inconsistent with a TCE release from the disposal area, for a variety of reasons, there were no meaningful efforts in the early 1980s to identify other potential sources of TCE. These reasons included (i) General Mills’ sense of corporate responsibility and duty to the community, (ii) an absence of other parties reporting historical disposal or releases of TCE in the subsurface, and (iii) the infancy of site investigation techniques, analytical methods and understanding of the fate and transport of contaminants in the environment. Further, in the early 1980s, it was not yet recognized that accidental releases and unreported in-ground disposal of TCE were relatively common.

Therefore, the possibility that the disposal area overlaid a large TCE plume originating from other sources was not considered with the seriousness that it would be if the initial investigations were being conducted today.

Following completion of the initial site investigation and plume delineation activities, the TCE impacts in the Glacial Drift aquifer were managed as if they were solely attributable to the Site. A groundwater pump and treat system designed to intercept groundwater flowing under the Site removed over 6 billion gallons of groundwater and over 7000 pounds of TCE from 1985 to 2010.

Over the decades, a number of separate pieces of information became available that were inconsistent with the conceptual site model that the disposal area was a primary source of TCE in the Glacial Drift aquifer. However, as early as the late 1990s, the TCE concentrations in the Glacial Drift aquifer appeared to be approaching the clean-up standard of 270 micrograms per liter (ug/L) established by the 1984 Consent Order between General Mills and MPCA. As a result, neither MPCA nor General Mills conducted a comprehensive re-evaluation of the conceptual site model.

In 2013, soil gas testing requested by the MPCA led to the identification of elevated TCE concentrations in sub-slab samples collected from area properties. The resulting vapor intrusion concerns and other factors prompted additional Site investigation activities and a re-evaluation of the Site. These investigations led to the discovery of concentrations of TCE in groundwater up gradient of the Site that were an order of magnitude greater than those present down gradient of the Site. Further, we found evidence of historic use and disposal of chlorinated solvents at other properties in the area. Notably, some of these facilities used (or are strongly suspected of using) TCE in connection with manufacturing, automobile repair and other industrial repair and maintenance operations.

Acknowledging the presence of the up gradient TCE sources, in June 2016 MPCA listed the Southeast Hennepin Groundwater and Vapor Site on the Minnesota Permanent List of Priorities.

Leading Expert Review. In order to better understand potential groundwater and vapor impacts of the disposal area, we engaged two of the leading experts in the field to consult with us:

- **Dr. Michael Kavanaugh** is a Senior Principal Environmental Engineer at Geosyntec, with more than 35 years of experience regarding hydrogeological issues at hazardous waste sites. Dr. Kavanaugh is an elected member of the National Academy of Engineering since 1998. He has contributed to more than 80 technical papers, teaches the Princeton Groundwater Course, and is a consulting professor in the Stanford University Civil and Environmental Engineering Department.
- **Dr. Thomas E. McHugh** is a toxicologist and environmental scientist with GSI Environmental, Inc. (GSI), with over 20 years of experience in toxicology and environmental science and engineering, specializing in the areas of human and ecological

risk assessment, environmental site investigation, and corrective action design. He has worked on hundreds of projects involving environmental risk assessment, site investigation and conceptual site model design, and remediation.

Comprehensive Evaluation. Dr. Kavanaugh and Dr. McHugh conducted a comprehensive scientific review of the numerous reports and investigation results for the Site covering the time period from 1980 to present. They obtained and independently reviewed publicly-available information from the MPCA. They compiled investigation results from these sources, and they conducted independent analyses of these data. We asked Dr. Kavanaugh and Dr. McHugh to prepare written reports for submission to the MPCA. Their reports are attached.¹

Dr. Kavanaugh's and Dr. McHugh's key conclusions are:

- 1. The historic conceptual site model was founded on two faulty assumptions -- that solvent wastes from the disposal area caused all groundwater impacts and contained significant amounts of TCE.** The only evidence that the disposal area was a significant source of TCE was the presence of the TCE plume in the Glacial Drift aquifer. There is no primary evidence that General Mills ever handled or disposed of significant amounts of TCE at the Site. Nor is there primary evidence that General Mills disposed enough TCE to create a plume this size. To the contrary, the primary evidence is that TCE was a very minor component of the General Mills waste. (See the summary of testimony of former employees at the Site, at Table 2 in Dr. McHugh's report.) Further, with the discovery of the strong up gradient sources of TCE, it has become clear that the Site was not a significant historical source of TCE to soil and groundwater in the area, and is not a TCE source today. No up gradient investigation will alter these findings.
- 2. The General Mills waste material had a unique signature containing only minor amounts of TCE.** The waste was a complex mixture dominated by petroleum solvents that also included chlorinated solvents ("cVOCs") such as 1,1,1-trichloroethane ("TCA"), 1,1,2,2-tetrachlorethane, and chloroform in amounts greater than the minor amounts of TCE reported by former General Mills employees. (See Table 2 in Dr. McHugh's report). No up gradient investigation will alter these findings.
- 3. General Mills waste material was confined to a small area in the immediate vicinity of the disposal area.** Because the General Mills waste was comprised mostly of petroleum solvents with a smaller amount of chlorinated solvents (including minor amounts of TCE), the resulting mixture was less dense than water, a light non-aqueous phase liquid ("LNAPL"). We know this because the disposal area investigation results found the highest concentrations of solvents in soil samples collected from above or on the top of the Glacial Drift aquifer. These results demonstrate that the solvent wastes did not migrate downwards below the top of the Glacial Drift aquifer. Similarly, chemicals characteristic of the General Mills solvent waste were only detected in wells that were

¹ Supplemental Report on VOC Sources and Remediation at the General Mills/Henkel Superfund Site, Dr. Michael Kavanaugh, Geosyntec Consultants, dated March 15, 2017; and Evaluation of Remedy Completeness at the General Mills/Henkel Corporation Superfund Site by Dr. Thomas McHugh, GSI Environmental, Inc., dated March 14, 2017.

both: (i) located close to the disposal area, and (ii) screened at the top of the Glacial Drift aquifer. No up gradient investigation will alter these findings.

4. **The General Mills waste was not, and is not, a dense non-aqueous phase liquid (“DNAPL”) source of impacts to groundwater and soil gas.** Because of the characteristics described above, the solvent mixture disposed at the Site was not and is not an ongoing TCE dense non-aqueous phase liquid (“DNAPL”) and is not, therefore, a continuing TCE source at the Site. In other words, any TCE in the waste solvents disposed at the Site would be dissolved in the solvent mixture and was not a separate phase that could sink through soil and groundwater underlying the Site. There is no evidence of a DNAPL signature for the waste solvents and, thus, there is no remaining residual that would be an ongoing TCE source displaced from the original disposal location. No up gradient investigation will alter these findings.
5. **The Site is fully remediated.** The “pump and treat” remediation system that General Mills operated from 1985 to 2010 successfully remediated the chlorinated solvent soil and groundwater impacts from the Site by 1991. These chlorinated solvents were “non-detect” by 1996. By extracting over 50 “pore volumes” of groundwater in the water-bearing materials in the Glacial Drift aquifer at the Site -- a volume that far exceeds the theoretical volume for greater than 99 percent removal -- the “pump and treat” system was highly effective in removing all the General Mills waste. Again, we can state this so confidently because of the unique chemical mixture found in the General Mills waste solvents. Even though TCE has persisted in groundwater beneath the Site since then, it is not the result of historical waste solvent disposal at the Site for the following reasons:
 - The General Mills waste has a signature that was distinct from the up gradient sources of TCE. The other “cVOCs” in the General Mills waste have fate and transport characteristics similar to those of TCE. These other cVOCs are no longer detectable in groundwater. Because these cVOCs were originally present in the waste at the Site at concentrations higher than the concentration of TCE, and because these cVOCs are not detectable in the groundwater, any TCE formerly attributable to the Site is also remediated.
 - Therefore, all of the cVOCs attributable to the Site, including TCE, were cleaned-up by the pump and treat system.
 - Accordingly, the persistence of TCE down gradient of the Site can only be explained by impact from up gradient sources.

No up gradient investigation will alter these findings.

6. **The Site is not a source of TCE to groundwater or soil vapor.** Extensive site characterization has further demonstrated that there are no historic potential sources of volatile organic compounds on the Site other than the disposal area, which has been cleaned up. There is no evidence that the Site contributes TCE to the groundwater or the vapor intrusion pathway in the area. No additional investigation of up gradient sources will alter these findings.

7. TCE from up gradient sources has been contaminating the area for decades – and still impact the Site and the Como Neighborhood. Considering both current and historical information, it is now clear that up gradient sources of TCE in groundwater were already impacting the Site and areas further down gradient in the 1980s. These up gradient TCE sources contributed significant amounts of TCE in the past to the groundwater at and down gradient of the Site. Among other evidence supporting this finding, is the following:

- Investigations dating from the 1990s to present – including data and information from MPCA – have shown that there are multiple sources of TCE and other chlorinated solvents not associated with the Site, including most significantly sources located up gradient (i.e., northeast) of the Site. However, until recently, the investigation results were scattered among disparate environmental investigations conducted under MPCA oversight. When General Mills compiled all of the available investigation results, they showed a large continuous plume of TCE originating northeast of the Site, impacting the Site, and extending southwest of the Site.
- Monitoring well results show TCE concentrations are an order of magnitude higher in parts of the up gradient area than at the Site itself, consistent with the presence of a large up gradient source or sources responsible for much of the current TCE plume.
- The plume length and the plume width can only be explained by up gradient sources. The plume is more than 1000 feet wide at the Site. Although the plume was mistakenly attributed to the Site in the 1980s, the single source of the disposal location at the Site was only one 55-gallon barrel wide and only three 55-gallon barrels deep. The structure caused it to behave like a funnel. This single, limited disposal area cannot explain the wide, lateral extent of the TCE plume that has persisted over three decades.
- Similarly, the recent investigations show a TCE plume originating at least a half mile northeast of the Site and extending 4000 feet down gradient of the Site. Stated differently, the Site is located at roughly the midpoint of the plume, on its northwest shoulder. Given the lithology and hydrodynamics of the area, such a plume footprint can only be explained by multiple sources of TCE up gradient of the Site.
- The distribution of TCE within the Glacial Drift aquifer provides no evidence of on-going impacts associated with the Site. These impacts of the up gradient sources extend in a continuous plume south and southwest to impact the Como Neighborhood, including the Site.
- Most of the TCE mass that would need to be addressed by a groundwater remedy is north of Hennepin Avenue, the area currently under investigation by the MPCA as the Southeast Hennepin Groundwater and Vapor Site.

8. No additional remedial actions are necessary to address impacts from the East Hennepin Site. The most important conclusions of this expert review are that the East

Hennepin Site is completely cleaned up, does not pose a threat to human health or the environment, and meets all requirements for de-listing. The chlorinated solvents, including TCE, associated with the waste from the disposal area are no longer detectable in groundwater. All detectable TCE in groundwater – including in concentrations above the MCL – is associated with other sources. No additional remediation is required to address impacts associated with the Site. No up gradient investigation will alter these findings and conclusions as to the Site.

- 9. The MPCA must revise its conceptual site model to address the up gradient TCE sources instead of the fully-remediated East Hennepin Site.** The MPCA’s November 28, 2016, letter is based on a conceptual site model that does not account correctly for all available data and information generated over the past three decades of investigation and remedial actions. While acknowledging the up gradient sources, the conceptual site model reflected in MPCA’s November 28, 2016, letter asserts that the Site remains a source of TCE to the groundwater and soil vapor in the area. The MPCA must develop a revised conceptual site model that accurately reflects the historical and present impact of the plume from the up gradient sources on the Site and other areas within the Como Neighborhood, and accurately reflects that the disposal area has been fully remediated. The Conceptual Site Model must be modified as set forth in the table below:

ATTRIBUTES OF THE THREE CONCEPTUAL SITE MODELS

Attribute	Historical CSM	“November 28, 2016, Letter” CSM	Revised and Correct CSM
Source of TCE	Sole, strong source at General Mills Site	East Hennepin Site continues to be a TCE source.	Up-gradient source(s) only.
Pump & Treat (“P&T”) Effectiveness for TCE	Expected to be effective in source control and concentration reduction	Effective in meeting remedial objectives, approved shut-down in 2010.	Effectively removed the identified release from the disposal area from groundwater by 1996.
TCE Plume Persistence Down-Gradient of Site	Large solvent release including TCE from the Site	East Hennepin Site continues to be a TCE source to “area-wide contamination.”	TCE was a minor component of the Site release; Site not a current TCE source to groundwater; large TCE release from up-gradient source(s).
VI Exposure Pathway	TCE from Site impacts shallow zone in glacial drift aquifer, causing a potential VI exposure pathway	Not explicitly addressed in letter, but MPCA seeks plan for VMS in letter	TCE from up-gradient sources, but not the East Hennepin Site, impacts shallow zone up gradient and down gradient from Site, causing a potential VI exposure pathway.

Attribute	Historical CSM	“November 28, 2016, Letter” CSM	Revised and Correct CSM
Presence of DNAPL from Site	Not included, but later suspected due to persistence of TCE plume	Not addressed in letter	Disproven by science-based multiple lines of evidence approach.
TCE Plume Dimensions	Plume extends from the Site and is about 1,000 feet wide at the Site and 4,000 feet long	Not addressed in letter	Up gradient plume(s) is not yet fully characterized but is 5,000+ feet long; no “clean area” between the Southeast Hennepin Site and the Site.
Purpose	Basis for remedial action plan. During groundwater P&T, no update was needed until delisting process began	East Hennepin Site put on hold until Southeast Hennepin Site advances to same stage of “Superfund” process	Initial CSM and November 28 CSM did not correctly account for all available data and information; revised and correct CSM was needed.

III. Response to MPCA’s Request for Plan.

Necessary MPCA Actions. Through the use of the revised conceptual site model, as set forth above, MPCA must focus its efforts in the right place – the up gradient sources, the true cause of groundwater and soil gas impacts in the area — not the Site. Failure to do so will inevitably result in waste of resources and delay in requiring those responsible for these up gradient TCE sources to identify and implement appropriate solutions.

There is no factual or legal basis to continue to list the Site or to require further remedial actions from General Mills as to the Site. Therefore,

- The 1984 Consent Order and the 2014 RAP Modification No. 1 must be terminated;
- The Site must be delisted from the Minnesota Permanent List of Priorities and from the National Priorities list; and
- Responsibility for the installed base of vapor mitigation systems, sentinel network monitoring and reimbursement of electrical costs must be transferred to the parties responsible for current TCE impacts, or to the MPCA itself.

Response to MPCA’s Request for Plan. In the November 28th letter, MPCA requested that General Mills submit a plan to address: (i) operation and maintenance of the vapor mitigation systems, (ii) reimbursement of electrical costs to homeowners for operating the VMSs, (iii) the buildings in the “Study Area” that do not have a VMS, and (iv) ongoing sentinel monitoring of soil-gas and groundwater.

General Mills’ responses are as follows:

- 1) Develop an O & M Plan for Vapor Mitigation Systems.** The VMSs that General Mills has installed are working effectively to prevent any risk to public health. General Mills conducted an exhaustive investigation of subsurface conditions in buildings in the Study Area. Where there were TCE levels above applicable screening levels, and where property owners gave General Mills access-- as the vast majority did-- General Mills' contractors designed and installed each mitigation system taking into account the unique factors of each building. In other words, the previously-installed VMSs are not "off the shelf" systems. Further, these systems were designed to be durable and to operate without regular maintenance. Homeowners have been instructed to check the manometers occasionally as an indicator that the systems are working. General Mills' contractors left instructions and telephone numbers for service. These contractors have received a handful of calls from homeowners since the systems were installed and have responded appropriately. During the transition period, General Mills and its contractors will continue to respond to calls as necessary.
- 2) Develop a schedule for reimbursement of electrical expenses for VMS.** General Mills is cognizant of the electrical expense of operating the VMS. Given that the VMSs are addressing any risks due to up gradient TCE sources, not from the Site, General Mills believes that final responsibility for reimbursing homeowners should be the responsibility of persons liable for the up gradient sources. General Mills is prepared to discuss an orderly transition to MPCA or to those persons liable for the up gradient sources.
- 3) Develop a plan for buildings in the Study Area with exceedances of the screening values that do not have VMSs.** A small number of such property owners refused VMSs, or simply did not respond to General Mills' numerous requests for access to their properties. General Mills informed MPCA on several occasions about these results and requested that MPCA obtain access for installation of VMS. MPCA has not, to our knowledge, obtained access to these properties. If MPCA has, in fact, obtained access, General Mills is prepared to discuss how to transition this responsibility to those persons liable for the up gradient TCE sources. As to the buildings on the Site, General Mills is prepared to discuss how to transition any further responsibility to MPCA and to those persons liable for the up gradient sources.
- 4) Continue ongoing sentinel monitoring for the soil gas monitoring network and the glacial drift groundwater monitoring network.** General Mills respectfully disagrees with MPCA that ongoing monitoring of the sentinel and glacial drift networks is necessary at the same frequency and with the same number of locations as conducted quarterly over the last two years. The results of the vapor intrusion pathway investigation, glacial drift sampling, the quarterly sampling of the sentinel network over the last two years and historical groundwater monitoring results indicate that the groundwater plume is stable or decreasing and that soil gas concentrations must also be stable or decreasing over the long term. On behalf of General Mills, Barr Engineering is submitting under separate cover a *2016 Sentinel and Glacial Drift Monitoring Network Report*, dated March 15, 2017, which specifically concludes that:

- Based on wells that have been monitored since the 1980s, TCE concentrations in the Glacial Drift aquifer have declined significantly over the last 30 years. Many individual wells that have been monitored in both the 1980s and the 2010s show a 90% or greater decrease in TCE concentrations over that time period. This relatively slow long-term decline in TCE concentration is consistent with natural attenuation of up gradient TCE sources.
- Analysis of groundwater monitoring results from the last two years shows no statistically-significant concentration trends in the sentinel monitoring wells. The monitoring results from the last two years are consistent with the long-term monitoring records documenting a slow decline in TCE concentrations in the Glacial Drift aquifer over time.
- Because the TCE in soil gas originates from the TCE plume in the Glacial Drift aquifer, the long-term decreasing trend of TCE in groundwater must also be occurring in soil gas.
- Based on a statistical trend analysis, the results of the sentinel network monitoring show that TCE in soil gas are stable or decreasing over the last two years of monitoring.

Accordingly, Barr Engineering and Dr. McHugh recommend that frequency of sampling and number of sampling locations be reduced. However, the selection of specific locations for monitoring may be influenced by the results obtained from additional source investigation activities. General Mills is prepared to discuss with MPCA transitioning responsibility for conducting the next monitoring to those responsible for the up gradient TCE sources.

General Mills is prepared to meet with MPCA promptly to terminate the Consent Order and RAP Modification, delist the Site, and effect an orderly transition, bringing General Mills' involvement to an end. Please contact me to arrange a meeting.

I look forward to hearing from you.

Sincerely,



Larry Deeney
Senior Technical Leader – Global Environment

cc: Hans Neve (via email only) (w/encl.)
Carmen Netten (via email only) (w/encl.)
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