



October 22, 2007

Ms. Ashley Holt  
State Remediation Section  
Tennessee Division of Solid Waste Management  
5<sup>th</sup> Floor, L&C Tower  
401 Church Street  
Nashville, Tennessee 37243

RE: Egyptian Lacquer Manufacturing Company  
Ground Water Corrective Action Plan and Consent Agreement and Order

Dear Ashley:

Attached are written technical comments submitted on behalf of the Harpeth River Watershed Association (HRWA) regarding the proposed Ground Water Corrective Action Plan (CAP) and the associated Consent Agreement and Order. We trust that our comments will receive careful and diligent consideration. Specifically, our comments address the inadequacies associated with the following: the environmental investigative activities that became the basis for technical decisions in the CAP; the CAP itself; and the Consent Agreement and Order that is the regulatory mechanism for the CAP and the supportive investigations.

There is adequate technical support to justify complete rejection of the CAP by TDEC because of the inadequate scope and scale of the investigative activities, the lack of adherence to industry and EPA standards for conducting investigations for the purpose of making remedial decisions, the lack of a thorough corrective action measures evaluation of high potential alternatives, and the lack of adherence to EPA criteria for selecting monitored natural attenuation (MNA) as a remedial action.

Selection of MNA by ELMCO does not even meet the general EPA handout requirements provided by TDEC to attendees at the October 10, 2007 public hearing. As examples, the handout stated that MNA works best where the source of the pollution has been removed. This is not the case for the proposed corrective action because Triad has admitted that there is free product in the bedrock that will be a source of free and dissolved-phase contamination for likely years to come. Further, the extent to which free product exists beyond the ELMCO property line has not been defined. Secondly, the flier explained that regular monitoring is needed "to make sure that pollution doesn't leave the site". Obviously, this is occurring on a 24-hour-a-day basis for the foreseeable future.

Although not specifically a part of the CAP, we believe that the regulatory mechanism that requires such, the Consent Order and Agreement, should be modified because of the following inadequacies relative to the investigative and remedial activities required:

1. The Order failed to include specific criteria for soil, groundwater, or air remediation levels to define clean-up objectives that are protective of human health and the ecological environment. Without those criteria, there is no pre-established expectation of what degree of clean-up and environmental protection for area restoration is required. These criteria should be included in a new, modified Order.
2. The Order continually refers to the ELMCO site as an “inactive” hazardous substance site. The site is an active manufacturing facility with an ongoing release of regulated hazardous wastes to the waters of the State in violation of the Clean Water Act and the Tennessee Water Quality Control Act.
3. The Order specifically assigned responsibility of a release of toluene and acetone to ELMCO, and the Order specifically described the investigative actions to mitigate and investigate. However, the Order did not assign responsibility for the numerous other industrial chemicals that have been detected that are known to be used as raw materials by ELMCO. The Order should be modified to include all chemicals that are observed in soil and groundwater and into the waters of the State where there is a reasonable potential for ELMCO to be the responsible party.
4. ELMCO agreed in the March 1, 2007 meeting with TDEC to initiate investigative activities to “delineate” the extent of contamination. To-date, the extent of the contamination has not been defined off-property in a residential area or on-site and therefore, a remedy cannot be selected.
5. According to the Order, a *Phase II Groundwater Assessment Plan* was due to TDEC in June 2007 to “define the horizontal and vertical extent of the contamination plume”. To-date, the nature and extent of the contaminant plume of neither the soil nor groundwater have been determined. As a result, ELMCO is out of compliance, and a penalty is warranted.
6. The Order included no penalties (financial or otherwise) for non-compliance. EPA guidance on this matter states “a critical component in the development of facility-specific incentives is the inclusion of penalty provisions in enforcement documents, and collection of penalties when the facility fails to comply with the permit or order”. Further, the EPA concluded “penalty provisions in consent orders should contain stipulated penalty provisions, including provisions for interest on any unpaid stipulated penalty balance”. The Order should be amended to define the penalties for non-compliance relative to the required clean-up criteria.

I am concerned that if TDEC were to approve ELMCO’s proposed CAP, doing so would be approving a corrective action approach and supporting environmental investigation that do not meet core EPA requirements, as listed in the attached written



comments. Not meeting EPA requirements thereby means TDEC would not be meeting its responsibilities as a state agency authorized by EPA to implement RCRA and the Clean Water Act. I sincerely hope that TDEC can meet all of these requirements and keep the responsibilities of the clean up of ELMCO's toxic releases within TDEC's jurisdiction.

We look forward to receiving your written, detailed responses to our comments.

Sincerely,

A handwritten signature in black ink that reads "Mark Quarles". The signature is fluid and cursive, written over a light grey rectangular background.

Mark Quarles, P.G.

Attachment: Technical Comments

cc: Pam Davie, HRWA  
Dorie Bolze, HRWA



**The *Groundwater Corrective Action Plan for the Solvent Release at the Egyptian Lacquer Manufacturing Company in Franklin, Tennessee* (hereinafter referred to the “groundwater CAP”) does not meet US EPA requirements<sup>1 2</sup> for monitored natural attenuation (MNA) for selection as a remedial action.**

1. The use of monitored natural attenuation (MNA) as a component for remedial action does not meet EPA’s criteria. According to EPA guidance, use of MNA as a remedy should only be used when the selected remedy will “meet the site remediation objectives within a timeframe that is reasonable when compared to that offered by other methods”. The proposed remedy offers no factual time of completion for natural attenuation to meet remedial objectives, nor did the CAP compare the timeframes associated with all remedial options considered.
2. The ELMCO site does not qualify for MNA given the direct and quick connection to Liberty Creek and the Harpeth River. The EPA expects that MNA “will only be appropriate for sites that have a low potential for contaminant migration”, which is clearly not the case here.
3. Liberty Creek and springs into the Harpeth River are critical base flow components to the Harpeth River flow. The EPA concluded “groundwater should be returned to their beneficial uses as soon as practical”. EPA defines a “beneficial use” as groundwater that discharges to surface waters and becomes a critical base flow component of the receiving streams. As a result, both Liberty Creek and the Harpeth River should be returned to their highest quality conditions as soon as practical.
4. EPA concluded that MNA “will be an appropriate remediation method only where its use will be protective of human health and the environment and it will be capable of achieving site-specific remediation objectives within a time frame that is reasonable compared to other alternatives”. Clearly, the proposed remedy is not protective of human health or the environment, and no timeframe for remediation was given in the CAP.
5. EPA concluded that “MNA should not be viewed as a direct or presumptive outcome of a technical impracticability determination”. The selection of MNA by ELMCO is essentially a presumptive remedy without first completing a detailed argument for technical impracticability (TI), as defined by the EPA. ELMCO has not demonstrated that the most appropriate cleanup levels cannot be practicably attained using all available, reasonably applicable technologies.
6. ELMCO has not completed the technical arguments necessary to demonstrate that a TI argument is warranted. To make such a



demonstration, ELMCO should have included, at a minimum according to EPA criteria, a discussion of the applicable or relevant and appropriate requirements (ARARs); a detailed conceptual model; data to support exactly why the TI is requested; a demonstration that the contaminant source(s) have been identified; an analysis of ongoing remedial actions; predictive analyses of the timeframes to attain the required clean-up levels; a demonstration that no other remedial technology could reliably, logically, or feasibly attain the clean-up levels within a reasonable timeframe; and an estimate of all costs of all proposed remedy options. No such information was provided by ELMCO and therefore, it is presumed that selection of the MNA was a presumptive remedy without basis.

7. EPA concluded “decisions to employ MNA as a remedy or remedy component should be thoroughly and adequately supported with site-specific characterization data and analysis”. Site characterization to support MNA “warrant a quantitative understanding of source mass; groundwater flow (including preferential pathways); contaminant phase distribution and partitioning between soil, groundwater, and soil gas; rates of biological and non-biological transformation; and an understanding of how all of these factors are likely to vary with time”. Further, investigative activities should result in an understanding of aquifer hydraulics, recharge and discharge areas and volume, an evaluation of nutrients and electron donors and acceptors in the groundwater, the anticipated rate of attenuation, and specific analyses to measure microbial populations in the subsurface. A detailed conceptual model is supposed to detail all of these critical components as the foundation for MNA, yet the conceptual geologic model in the CAP did not include these components.
8. EPA recognizes that LNAPL in free or residual phase “represents a significant mass of contamination that will serve as a long-term dissolved-phase source”. The CAP allows for an undetermined mass of light non-aqueous phase liquid (LNAPL) to remain in the ground untreated, creating a long-term detrimental impact to the waters of the State and daily violations of the Tennessee Water Quality Control Act and the Clean Water Act.
9. EPA has determined that site characterization should include collecting data to define (in three special dimensions over time) the nature and distribution of contaminants of concern and contaminant sources, as well as potential impacts on receptors. The proposed remedy does virtually nothing to mitigate the impacts to fish and aquatic life, to wildlife that depend on surface waters for survival, or to human receptors.
10. The EPA concluded “MNA will generally not be appropriate where site complexities preclude adequate monitoring” and that complex geologic conditions (e.g. karst) are a good example when MNA should not be used



because of the inability to adequately accomplish performance monitoring. Triad Environmental Consultants (Triad) has argued that the site groundwater cannot be reasonably monitored with groundwater wells, and that the karst geologic conditions result in the inability to adequately monitor the site. As a result, Triad concluded that MNA is not a reasonable remedial option yet recommended it anyway.

11. EPA concluded that MNA “should not be used where such an approach would result in either plume migration or impacts to environmental resources”. The proposed remedy does virtually nothing to further prevent plume migration from the currently effected areas.
12. EPA concluded that when clean-up objectives cannot be met within a reasonable timeframe, “a remedial alternative that more likely would meet these expectations should be selected”. The clean-up objectives have never been defined by TDEC nor has ELMCO ever been able to define the length of time for MNA to achieve EPA or TDEC water quality standards. As a result, MNA should not have been selected.

**Specific comments relative to the CAP and its technical attachments and appendices are as follows:**

1. Triad explained in the CAP (Section 3.1) that TDEC, not Triad, had determined that “no further investigations for contaminant releases at the Site are needed”. As a result, ELMCO has, through its consultant Triad, placed the responsibility of not conducting more investigative activities on TDEC, even though the requirements for investigative activities detailed in the Order have not been met. ELMCO has the responsibility, by law, to adequately and completely define the extent of the contamination and meet all remedial objectives.
2. TDEC committed in the May 17, 2007 letter from Mr. Chuck Head to Ms. Dorie Bolze of the HRWA that the environmental investigation will begin “at the point of the release and will move from there until the extent of contamination in the soil and groundwater is determined”. To-date, this has not been demonstrated by ELMCO because the nature and extent of contamination has not been determined beyond the ELMCO property, other than multiple discharge points into the waters of the State located hundreds of feet away.
3. The soil and groundwater investigation performed by Triad does not meet the minimum requirements of EPA for determining the horizontal and vertical extent of contamination of any constituent. The EPA defines<sup>3</sup> such extent as “the horizontal and vertical area within which the concentrations of hazardous



- constituents in the environmental media being investigated are above detection limits or background concentrations indicative of the region”.
4. The groundwater CAP determined that the “volume of the release cannot be determined” for a variety of reasons that relate to historical inventory inadequacy, the unknown length of time of the release, and an unknown leakage rate. Triad claimed in the groundwater CAP that the mass of the contaminants in the soil and groundwater is not known. If ELMCO had completed the TDEC-required delineation to define the vertical and horizontal extent of the contamination, the mass of remaining contaminants for purposes of corrective actions could have been determined. No soil or groundwater investigation has been completed off-property and therefore, the mass of polluted media is still unknown. As a result, ELMCO is unable comply with a basic component necessary to make reasonable conclusions on remedial cleanup. This is necessary in order to estimate the length of time for remedial actions to eventually result in the groundwater and surface water meeting all EPA and TDEC closure standards that are protective of human health and the environment.
  5. The proposed remedy does not meet TDEC’s Groundwater Classification Rule to allow contaminants to remain in the subsurface in excess of Tennessee water quality standards. ELMCO has not completed the application requirements for applying for a Site-Specific Impaired standard.
  6. Triad stated in the October 10, 2007 public hearing that VOC concentrations in Liberty Creek are reducing, yet actual TDEC-provided analytical reports show that they are in fact increasing.
  7. Triad concluded in the groundwater CAP that the dissolved phase component of the plume “poses no significant risk to ecological receptors in the Liberty Creek or the Harpeth River” – even though 20 percent acute toxicity was noted in one test. Further, the water quality has been shown to be highly variable (e.g. compare acetone results for Liberty Creek on September 12 and 13, 2007), so one test on one day does not indicate conclusive acute toxicity over the long-term. In addition to acute toxicity test mortality, dissolved oxygen studies performed by the HRWA indicated that that dissolved phase and LNAPL contaminants cause significant drops in dissolved oxygen concentrations below the 5.0 mg/l minimum requirement to sustain fish and aquatic life, as established by the Tennessee Water Quality Control Act. Therefore, there is no further basis for the Triad conclusion of no significant risk.
  8. The Consent Agreement and Order requires that ELMCO submit “all data that is obtained during the implementation of the CAPs”. The CAP included the results of the *Phase I and Phase II Groundwater Investigations* results in Appendix 2. A review of the laboratory analytical reports included in



Attachment 4 of that report suggests that groundwater samples were collected for the Extractable Petroleum Hydrocarbons (EPH) test, yet no data were presented for the results. Further, the analytical reports indicate that Triad requested chromatograms be provided so the actual range of hydrocarbons could be determined beyond what was reported in US EPA Method 8260, to give an indication of other organic compounds that might be present. No such chromatograms were provided in the report and therefore should be provided for adequate public review and comment to this CAP. Only through complete and thorough review of the all site data can informed decisions be made, and such information should have been included in the CAP for the public to provide comment.

9. The *Summary of Phase I and II Groundwater Investigations* (Appendix 2 in the CAP) report provided laboratory analyses, and the associated laboratory analytical reports indicated that the laboratory results were outside the acceptable levels of precision and accuracy and therefore, the reported data values are suspect and cannot be relied upon for accurate trend comparisons or for making remedial measure decisions.
10. ELMCO was required to submit two (2) soil corrective action plans (CAPs) for source area soils at the facility and also for the remediation waste soil pile located at the interceptor trench. The source area CAP was due in June 2007 and has apparently been implemented; however, there has been no demonstration that the remediation even worked. The only way to surely understand if the remediation worked is to advance more soil borings in the exact areas known to be contaminated and to compare the results. Groundwater monitoring will not accomplish this objective.
11. Triad explained during the October 10, 2007 public hearing that the amount of BIOX solution added to the tank farm subsurface soil was based upon the estimated pollutant mass beneath the immediate area of the tank farm. Further, Triad stated in a September 13, 2007 meeting with HRWA, Globally Green Consulting, and Stites and Harbison staff that no BIOX solution was injected within the bedrock (weathered or competent) or at the top of bedrock and therefore, the solution was injected well above the saturated zone. As such, not enough solution was applied to promote accelerated natural attenuation to the wider-spread area between the contaminated tank farm area and the receiving surface waters.
12. The CAP stated that the source of the “solvent” release was “eliminated as of February and March 2007” when two (2) supply lines for acetone and toluene were found to be leaking at two (2) piping elbows. The presence of other volatile organic compounds (VOCs) (e.g. methyl ethyl ketone, MIBK, isopropyl alcohol, 1,2,4-trimethylbenzene, etc.) in the soil, groundwater, and surface



- water are not explained by releases from two (2) virgin toluene and acetone tank lines.
13. The Phase II Environmental Site Assessment (ESA) performed by August Mack in October 2006 indicated that there are other possible sources of contamination of VOCs and semi-volatile organic compounds (SVOCs). For example, there is ample indication that some VOC and SVOC constituents (e.g. ethylbenzene, 1,2,4-trimethylbenzene, naphthalene, etc.) are associated with possible releases from three (3) underground storage tanks on-site that contained gasoline, diesel fuel, and heating oil that were never properly closed. Further, the Phase II ESA actually indicated that the highest acetone concentrations on-site were located near the manufacturing building – not at the aboveground tank farm. Triad advanced no soil borings near the manufacturing building.
  14. The May 17, 2007 letter from Chuck Head concluded “naphthalene is a key indicator of the presence of diesel fuel and No. 2 heating oil”. Per the August Mack Phase II ESA, diesel fuel and heating oil tanks existed at the ELMCO facility several hundred feet away from the “solvent” tank farm. Naphthalene was found at 2,300 parts per million (*Data Report of Soil Investigation Results*, April 11, 2007) in a soil sample (8.5 feet deep) collected at the tank farm with no explanation as to the source of that contaminant. Therefore, the source of naphthalene in the soil on-site has not been defined. Further, investigative sampling did not include any US EPA Method 8270 analyses for SVOC parameters.
  15. Boring logs of air rotary borings that were included in the *Phase I and Phase II Groundwater Investigation* report indicated that petroleum hydrocarbon odors (that were distinctly differentiated from solvent odors) were present during drilling. There is no explanation of what the source(s) of those odors might be. When Triad was questioned in a September 13, 2007 meeting at the Stites and Harbison office, Triad responded by saying that those odors were “natural” in middle Tennessee. There is no basis whatsoever to support the naturally occurring petroleum odor claim, especially given the historic uses of petroleum hydrocarbons on-site by ELMCO and the previous owner, Shell Oil (as a bulk oil storage terminal).
  16. The groundwater CAP concluded that the shallowest groundwater occurs at the top of bedrock. A review of the Geoprobe boring logs for the 20 borings that were advanced around the tank farm indicated that saturated groundwater conditions were present at the top of bedrock in 9 of 20 (45%) soil borings, yet only one groundwater well was properly installed to screen this interval.
  17. Of the four (4) wells installed on-site, only one (1) well (RW-1) is screened to bracket top-of-bedrock groundwater. Further, only RW-1 was installed within



the zone of highest concentrations; within the zone of highest hydraulic conductivity; and within the lowest bedrock elevations indicative of “cutters” or linear depressions in the bedrock. The top of the well screens (meaning that the actual screened intervals extend much deeper) for the remaining wells are at least 36 feet (MW-1), 27 feet (MW-2), and 17 feet (MW-3) below the top of bedrock and outside the zone of “cutters”, as defined by Triad during their Geoprobe drilling investigation. It is likely that the wells are monitoring different water-bearing zones than RW-1. As a result, a monitoring system capable of monitoring the zones of highest contamination and all migration pathways does not exist, and a system should be created.

18. Drilling operations for the only groundwater recovery well that was installed (RW-1) likely caused light non-aqueous phase liquid (LNAPL) observed at boring AR-1 to migrate further to the west towards Daniels Drive and Liberty Creek due to Triad’s use of 600 gallons of drilling water. Subsequent groundwater monitoring of the well that has apparently not indicated the presence of LNAPL is not surprising given the hydraulic head that would have been present with the addition of 600 gallons of water. There is no downgradient well capable of monitoring LNAPL in this area or off-property and therefore the extent of LNAPL is not defined.
19. Open borehole groundwater well AR-1 is likely incapable of recovering LNAPL or monitoring the groundwater from the zone of the highest contamination because of the steel surface casing that was set by Triad approximately five (5) feet into weathered and competent bedrock “to prevent cross-contamination of groundwater with solvent found at the top of bedrock”. The well can therefore not possibly provide an indication of the highest groundwater concentrations that exist.
20. Groundwater assessment activities used an air rotary drilling rig to advance borings. As indicated in AR-4 and AR-5 in the Phase I / II Groundwater Report, air rotary drilling missed discrete, shallow water bearing zones during drilling on June 11–12, 2007 when no water was detected during drilling, yet 15 feet of standing water from undetermined intervals was present in the boreholes one to two days later. Further, the depths of the borings exceeded the depths of the nearby Harpeth River by 25 feet.
21. As of the September 13, 2007 meeting at Stites and Harbison office, each well had only been sampled one (1) time and at no time, have all wells been sampled on the same day. Triad cannot possibly understand the groundwater characteristics enough to responsibly propose any remedy, much less a MNA remedy, with just one (1) groundwater sampling event and not having sampled all wells on the same day.
22. Triad proposed in the CAP that seeps be sampled monthly, yet groundwater monitoring wells MW-2, MW-3, and RW-1 would be sampled semi-annually,



and MW-1 would be sampled annually. There has yet to be a sampling event where all groundwater wells and seeps are sampled on the same day. All valid sampling points should be sampled monthly to provide consistent information on the rate and direction of flow and chemical quality. Secondly, additional groundwater monitoring wells should be required so that each water-bearing zone has at least three (3) wells (at least 2 downgradient and one upgradient) so that an accurate potentiometric surface diagram can be produced for each water-bearing zone, as required by EPA rules and guidance for groundwater investigations. Further, groundwater wells should be installed off-property. Currently, the existing groundwater well configuration does not meet minimum EPA requirements for quantity or location for environmental investigations of this nature.

23. Triad concluded that there is a “lack of free hydraulic connection” between wells MW-1, MW-2, MW-3, AR-1, and RW-1 and as a result, Triad argued that no potentiometric surface diagram could be developed for submittal in the CAP. Minimum EPA and industry-acceptable protocol requires at a minimum, three (3) wells to be installed in a triangular pattern within the same water-bearing zone to determine the direction of groundwater flow. This is especially critical when, as is the case at ELMCO, there are possibly more contaminated zones, there are preferential joint-controlled pathways, the groundwater represents significant hazards, the geologic conditions represent multiple exposure pathways, sensitive groundwater discharge pathways exists, and the contamination is located so close to a residential area.
24. Triad presented a groundwater potentiometric surface diagram at the October 10, 2007 public hearing and explained that all five well points (MW-1, MW-2, MW-3, AR-1, and RW-1) were used to develop the diagram. That diagram is invalid because the well points likely monitor different water-bearing zones and also Triad’s admittance in the CAP that there was no hydraulic connection between the wells.
25. Seep sampling at Liberty Creek has indicated the presence of dissolved-phase acetone, toluene, and multiple other VOCs that are used as raw materials by ELMCO, in addition to the presence of free-phase toluene. The occurrence of MIBK in the Harpeth River samples and none being detected in Liberty Creek; the occurrence of isopropyl alcohol in some (not all) Harpeth River seep samples and no Liberty Creek samples; and the predominance of acetone being detected in the Harpeth River all indicate that there are source areas other than the solvent tank farm. The Phase II ESA and the disparity between constituents from various seep samples all indicate other, undefined sources of VOC constituents. As a result, the nature and extent of the contamination has not been defined consistent with the Order.



26. Triad concluded in the groundwater CAP that a “large-scale, disruptive investigations along the presumed pathway” would be required to determine the migration pathways of LNAPL and dissolved phase contaminants from the ELMCO facility. Neither the Order (nor EPA regulations) require that the investigation be limited to “small-scale” investigations and therefore, this Triad argument has no merit whatsoever as a reason to not delineate the horizontal and vertical extent of the contamination. ELMCO is required to complete whatever investigations are necessary to meet the characterization requirements consistent with TDEC and EPA rules and guidance.
27. Triad concluded in the groundwater CAP that “it is clear from evidence gathered during the drilling of MW-3 (located closest to the residential subdivision) that there is a vapor-phase component to the plume” and that those vapors appear to be related to the groundwater contamination, which is determined by bedrock “cutters” and fractures. To-date, these bedrock conditions have not been determined beyond the ELMCO property line and therefore, the seasonal risk from vapor hazards has yet to be defined or properly mitigated. Incidentally, MW-3 does not seem to be located within a bedrock “cutter”, yet hazardous vapors were present and most recently, Triad stated at the October 10, 2007 public hearing that LNAPL was present. As a result, high levels of vapors and LNAPL are present in varying bedrock conditions.
28. The Triad conceptual geologic model (Figures 2 and 3) presented in the groundwater CAP indicated that the underlying bedrock bedding planes are flat, although the CAP reported “limestones in the vicinity of the Site dip slightly to the southwest”. Triad has not collected any area bedrock-specific field information to determine the bedrock dip. From the explanation given of the regional southwesterly dip and the flow direction (to the west) of the sanitary sewer along the Harpeth River, there is no actual data to support Triad’s belief that the tank farm is the source of contamination at seeps HS-2 and HS-3 along the Harpeth River. Triad should be required to determine the actual bedrock dip and pipe / trench grade to provide proof of their claim.
29. For the aboveground solvent tank farm to be the source of the contamination observed at seep HS-3 on the Harpeth River, the groundwater would have to flow presumably up-dip and upgradient, against the direction of bedrock slope and contrary to the preferred migration pathway along the “cutter”, as concluded by Triad. The Triad investigative activities have not yet reasonably and competently explained how this is possible.
30. Triad based their determination that “there is no significant risk to human health posed by the consumption of contaminated groundwater” on the fact that the groundwater is not used as a source of drinking water. First, there is no stated basis for what Triad determines to be a “significant” risk and what



criteria were used for comparison. Secondly, although the groundwater is not used for human consumption, it is used regularly for wildlife consumption and by fish and aquatic life. Further, the localized groundwater (at the point of the LNAPL discharge and downgradient) has been demonstrated to be the only base flow component to Liberty Creek during the driest times of the year. Liberty Creek provides base flow to the Harpeth River. Both the Clean Water Act and the Tennessee Water Quality Control Act assign numeric criteria for designated uses of all waters of the State, including those for wildlife and aquatic uses. The Triad report apparently did not consider these criteria in their assessment. The only criteria mentioned by Triad in the groundwater CAP were EPA Region IX Preliminary Remediation Goals (PRGs), and PRGs specifically exclude any impacts to groundwater and ecological concerns. As a result, use of PRGs in determining final corrective action objectives is invalid.

31. Triad concluded that “there is minimal risk to human health posed by contact with or inhalation of vapors from the free product component of the groundwater plume as it surfaces in the channel of Liberty Creek”, even though Triad concluded that vapor-phase migration of contaminated groundwater is occurring and the migration pathways exists to residential areas. Triad concluded that there is minimal risk without having multiple samples from homes during multiple seasons of high and low groundwater flow, high and low atmospheric pressures, or high and low ambient air temperatures. Further, this conclusion seems to in part, be based upon short-term worker exposure measurements made with a photo-ionization detector (PID). PID measurements are a crude screening mechanism that measures random carbon atoms in the air, not actual VOC or SVOC constituents. As a result, Triad cannot possibly understand the health and safety risks to residential occupants in the Daniels Drive area.
32. The Consent Agreement and Order required that ELMCO include a detailed evaluation of the air migration pathway in the CAP. The CAP included no summary or factual data to support Triad’s conclusion that there is “minimal risk” to human health and safety via the inhalation pathway.
33. Ensafe apparently was hired by Triad to evaluate the risks of vapor intrusion. The *Proposed Air Monitoring Near Liberty Creek* letter (June 8, 2007) to TDEC proposed to compare monitoring results to criteria established for short-term emergency response workers and workers in an industrial setting working 8-hour days. There is no indication that the plan or its criteria meet the minimum levels by EPA in the *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (EPA 530-D-02-004, November 2002). Further, there is no support in the CAP that comparing air sampling results to healthy, industrial worker 8-hour standards



- is in any way directly applicable to defining risks in a residential setting for children, adult, and elderly residents on either an acute or long-term basis. Further, the inhalation hazard risk determination did not consider the effects of exposures of multiple, cumulative constituents - just individual constituents.
34. The groundwater CAP included no discussion of the results of any vapor monitoring in homes and offered no conclusions relative to specific risk levels that are present. The Order specifically required that the air migration pathway be studied and appropriate mitigations be implemented, if necessary.
  35. Triad concluded in the groundwater CAP that pump and treat groundwater treatment is “not typically effective” in karst environments without having any site-specific data to support this claim. In fact, Triad installed RW-1 for the sole purpose of recovering LNAPL from the release area. That is why the well was labeled a “recovery well” by Triad. Surely at the time of the installation of RW-1, Triad believed that pump and treat or groundwater recovery was a viable option. There is no indication that properly located wells in the zones of lower-lying bedrock and large joints / fractures (called “cutters” by Triad) would not be a viable remedial alternative. In fact, loss of 600 gallons of drilling water during the installation of RW-1 indicates a zone of extremely high hydraulic conductivity that would likely be suitable for groundwater recovery in the zone of the highest observed soil and groundwater concentrations.
  36. Triad concluded in the groundwater CAP that the pump and treat groundwater remedial alternative represents “high costs”, yet no cost estimate was provided as a relative comparison to other remedial options. Therefore, using “high cost” as an excuse not to implement the pump and treat has no basis.
  37. Triad concluded in the groundwater CAP that groundwater stripping for toluene removal would require a “large-scale treatment facility”; would be “disruptive” to the area; and would be “cost-prohibitive”. No details were given to support any of these claims. Triad argued that groundwater stripping will generate large quantities of used carbon, requiring disposal as a hazardous waste. This excuse for not using air stripping as a remedial alternative has no basis as a reason to not conduct active remedial actions.
  38. Triad argued against contaminated groundwater removal because the City of Franklin cannot accept acetone-bearing water to the wastewater treatment plant. This is not a viable excuse to exclude removal as a remedial alternative. Triad and ELMCO have the expertise to manifest and dispose of contaminated remediation wastes to numerous licensed treatment facilities.



39. The groundwater CAP completed by Triad only considered groundwater pump and treat and air stripping as viable *ex-situ* remedial options. There are multiple other viable *in-situ* and *ex-situ* options never considered by Triad.
40. Triad argued against *in-situ* groundwater treatment because it is “technically infeasible and cost prohibitive” because of the plume size, the required number of injection points, and the inability to control treatment chemicals in the subsurface. Triad provided no support for the technical infeasible argument nor did the CAP include any cost estimates for comparative analyses.
41. Triad described natural attenuation as being a suitable remedial alternative “where the groundwater contamination poses no significant risk to human health or the environment, the source area has been removed or neutralized, and other remediation technologies are either inapplicable or cost-prohibitive”. First, ELMCO has not yet determined the nature and extent of contamination and therefore, cannot possibly conclude that there are no significant risks. Second, ELMCO has made no demonstration that remediation of the tank farm-area soils where severe contamination existed even worked. Therefore, there is no basis for their claim that the source has been mitigated. In fact, in the September 13, 2007 meeting between Triad, TDEC, HRWA, Stites and Harbison, and Globally Green Consulting personnel, Triad admitted that they have no proof that the remediation using BIOX chemicals even worked. Lastly, when asked in the September meeting what biological, physical, chemical, or other indicators exist to prove that natural attenuation is actually occurring or has the potential to occur at this site, Triad responded by saying that they had no specific site information to support this claim.
42. A BIOX manufacturer representative (Mr. John Kiest) who was familiar with the ELMCO site was contacted on October 3, 2007. Mr. Kiest stated that the BIOX solution could actually initially kill microbes that are necessary for biodegradation. There has been no demonstration that microbial populations capable of degrading multiple dissolved-phase constituents existed prior to or after the injection of BIOX.
43. There is no basis to support that natural attenuation or BIOX additives will remediate LNAPL in the saturated zone to meet Tennessee Water Quality criteria.
44. The groundwater CAP includes a “risk evaluation” of the acetone and toluene relative to human health and ecological factors. Other than brief conclusions of “no significant risk” or “minimal risks”, the risk assessment did not include any basis for those conclusions. The assessment did not evaluate or conclude what actual concentrations of specific chemicals pose a risk to human health through all migration pathways. Secondly, the assessment did not specifically include what concentrations constitute risk to the receiving



- streams relative to ecological health and their designated uses in the Tennessee Water Quality Control Act. Lastly, the risk assessment did not consider the cumulative effects of multiple constituents.
45. The only “active” remedial alternative chosen by Triad in the CAP is physical interception of LNAPL in a trench located 800 feet from the ELMCO facility. That trench was constructed as an interim measure required by TDEC in an attempt to capture LNAPL. The interceptor trench for LNAPL recovery will only be partially effective during periods of low groundwater flow, as was experienced during the summer of 2007 when Liberty Creek was mostly dry. When the creek is dry and when the groundwater elevation is lower than the bottom of the interceptor trench, the trench will do nothing to mitigate or recover LNAPL. In fact, LNAPL was still flowing into Liberty Creek on October 10, 2007 even though the trench was fully operational.
  46. The CAP described groundwater influent points to the interceptor trench at four (4) locations. Three (3) were located along the eastern (ELMCO side) of Liberty Creek while one (at 102 feet along the trench transect) enters from the west, as indicated on Figure 5 of the CAP. This indicates that LNAPL likely migrates beyond / under the interceptor trench during dry periods of the year. Given the dry conditions of Liberty Creek during much of the summer of 2007, it is likely that neither Liberty Creek nor the interceptor trench is a downgradient discharge barrier during all seasonal groundwater flow conditions. Unmonitored and unmitigated LNAPL is therefore likely flowing beyond the interceptor trench towards Franklin Road during the driest periods of the year.
  47. The CAP reported that the time required to collect LNAPL “cannot, at this time, be estimated”. Further, the time required for “clean-up” of the dissolved phase contamination cannot be estimated. These conclusions are due to the fact that the extent of the LNAPL has not yet been defined, as required in the Order. TDEC should require that the extent, rate of migration, and all migration pathways be defined as required in the Order.
  48. Triad argued in the CAP that use of remedial technologies to remediate the dissolved-phase groundwater plume is “technically infeasible”, without completing the required technical analyses to fully demonstrate that remediation of dissolved-phase constituents would in fact meet EPA’s criteria for a technical impracticability (TI) argument.
  49. Unmitigated dissolved-phase and LNAPL migration beneath residential properties on Daniels Drive can result in property damage of the individual residences. TDEC has the responsibility to ensure that this property damage is minimized, and the best way to minimize this damage is to conduct a complete investigation to define the nature and extent of the contamination and to remediate the contaminants.



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<sup>1</sup> Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (OSWER Directive Number 9200.4-17P).

<sup>2</sup> Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration, OSWER Directive 9234.2-25, September 1993.

<sup>3</sup> Extent of Contamination and Scope of Investigations in the HSWA Program, Corrective Action Standing Team, RCRA Branch, 1996.