MEMO

TO: Edison Wetlands Association
FROM: Dr. Peter deFur, Environmental Stewards Consulting, Inc.
DATE: June 19, 2017
RE: Groundwater and Surface Water
Ringwood, NJ
Review and Comments of Report titled
"Ringwood Mines/Landfill Superfund Site February 2017 Groundwater, Mine Water, and Surface Water Sampling"

This memo provides questions and comments based on Environmental Stewardship Concepts' review of the "Ringwood Mines/Landfill Superfund Site February 2017 Groundwater, Mine Water, and Surface Water Sampling" report. This report was prepared by Cornerstone Environmental, Ford Motor Company's environmental consultant for this project, and consists of a five page letter, eighteen individual data tables outlining current and historical sampling results, and six figures containing a sampling location plan and contaminant concentrations from the February 2017 sampling event.

The Ringwood Mine/Landfill site (Site) is located in the historic iron mining district of Ringwood in Passaic County, New Jersey and was utilized in the 1960s and 70s for the disposal of wastes from the former Ford automobile manufacturing plant in Mahwah, NJ, including paint sludge's. According to a summary by the U.S. Environmental Protection Agency (EPA), the site was discovered in 1979 and placed on the National Priority List (NPL) in 1983 (i.e., designated as a Superfund Site). Investigations and cleanup ensued, resulting in the Site being removed from the NPL in 1994. Due to additional paint sludge material discovered onsite which posed a direct, short- and long-term threat to human health and the environment, the site was relisted on the NPL in 2006; Ringwood Mines is the first Superfund site to be deleted from the NPL and later re-admitted.

There are three operable units (OU's) that make up the Ringwood Mines Superfund Site out of the four that were part of the original listing. In the original listing, the municipal landfill was designated as an Operable Unit due to its discharge of hazardous substances. It is unclear why the municipal Landfill was not included when the site was relisted in 2006. OU1 is representative of the first removal action of onsite paint sludge during the site's original listing on the NPL in 1983. OU2 and OU3 were added upon the site's NPL re-listing in 2006; OU2 consists of the three disposal areas: Peters Mine Pit, Cannon Mine Pit, and the O'Connor Disposal Area. OU3 addresses the groundwater across the site. At least four tributaries drain from the site into the Wanaque Reservoir,

which provides drinking water for over two -million New Jersey residents. Parts of the site fall within Ringwood State Park , posing its own unique remedial requirements (pursuant to N.J.A.C. 7:1E and the New Jersey Department of Environmental Protection's "Environmentally Sensitive Areas Guidance") ; other portions are being used by public utility, Borough of Ringwood as an active Recycling Center and Public Works operations, and as open space.

Groundwater, mine water, and surface water at the Ringwood Mines site were last sampled in May through June 2016, the February sampling event being the third time 1,4-dioxane was sampled for using the EPA 8270 SIM ID method. The February 2017 samples collected by Cornerstone were analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs), 15 tentatively identified compounds (TICs) and total/dissolved arsenic and lead by Test America -Edison, and 1,4 -dioxane by Al pha Analytical. Analytical data validation reports were prepared by Cadena, Inc.

The states in their "Site Contaminants Facts" online documents, the primary Contaminants of C oncern (COC) at the Ringwood Mines Superfund Site groundwater contaminants are arsenic, cadmium, and inorganic lead and 2,3,7,8-tetrachlorodibenzo-p-dioxin. This form of dioxin is considered by the USEPA to be the most studied and most toxic of Dioxins . Substances sampled for in February 2017 reflect these contaminants of concern that "pose an unacceptable risk to human health or the environment".

Comments and question regarding the February 2017 Cornerstone Report:

1,4-dioxane samples and quality control issues:

1,4-dioxane is a common solvent used in industrial processes including the manufacturing of paints and varnishes. It is a clear liquid that easily dissolves in and migrates through water. According to the Agency for Toxic Substances and Disease Registry (ATSDR), human health effects from exposure to 1,4-dioxane may include eye and nose irritation, liver and kidney damage, and even death. The US Department of Health and Human Services (USDHHS) deems 1,4-dioxane as a reasonably anticipated human carcinogen. Since few studies are available, other unexplored adverse health effects may result from exposure to 1,4-dioxane.

In table 2A of the Cornerstone Report 23 out of 25 samples from 22 groundwater wells, including Cornerstone's split samples with Test America, exceeded the New Jersey interim Groundwater Quality Standard for 1,4-dioxane (0.4 ug/L or parts per billion). These results confirm that these industrial chemicals are a continued source of

contamination to the groundwater in and around the Peter's Mine Pit area located in Ringwood State Park. 1,4-dioxane extends to seeps and surface waters, presenting an unacceptable risk to human health and the environment.

These results validate previous analytical samples that also found elevated 1,4-dioxane concentrations in excess of ground and surface water standards. This confirms that 1,4-dioxane has a source in the Peters Mine Pit (PMP). Since 1,4-dioxane is a synthetic chemical and does not occur naturally in the environment, the source areas must be identified and removed before any engineering controls can be considered for the Peters Mine Pit (PMP) area. The current recommendation of capping will not address this problem and is not an appropriate remedy. The USEPA must issue an Explanation of Significant Differences (ESD) or amend the Record of Decision for this area as capping will not address the source of 1,4-dioxane in the groundwater and surface water that is discharging from the PMP.

The waste in the mine pits is the likely source of the 1,4-dioxane, based on the fact that this chemical was used in a number of industrial applications for decades, including as a solvent in paints and varnishes. The three identified paint sludges dumped by Ford Motor Company are the main source of contamination posing an unacceptable human and ecological health threat at Ringwood Mines Superfund Site and downstream of the site.

1,4-dioxane continues to leach as is demonstrated by the continued chemicals being detected in samples, and natural processes have not diminished concentrations of 1,4-dioxane in the groundwater. It is important to note that ground and surface water sampling are only being conducted on a yearly basis and despite the lack of sampling events these synthetic chemical compounds are being detected in a majority of samples conducted.

Issues with the report's data quality and validity of sample results: While technical in nature, the report's findings are only as valid as the quality of data and strict controls during the analytical process. There were many technical discrepancies uncovered during the review of the Cornerstone report. Below are some of the critical ones that require addressing:

- **The report indicates that there were significant technical discrepancies with 8270D SIM ID sampling method used for 1,4-dioxane.**

  Isotope dilution is used to counter the natural loss of a contaminant during analysis. Surrogate samples are similar in chemical properties as the field

sample being analyzed. A known quantity of a surrogate (in this case 1,4-dioxane d8) is analyzed concurrently with the sample being tested; the surrogate serves as a point of comparison to evaluate percent recovery (%R) of the sample. Percent recovery (%R) must be 50%-200% or greater for data to have scientific validity and meet QA/QC requirements, according to NJDEP "Data Quality Assessment and Data Usability Evaluation Technical Guidance (April 2014)" and "Data of Known Quality Protocols Technical Guidance (April 2014)". **All** of the 1,4-dioxane field samples were below the 50%-200% daily CCV internal response criteria, and Alpha Analytical incorrectly set the lower limit for %R at 15% instead of 50%, therefore portraying the data as meeting the %R standards.

- **A Michigan *groundwater standard* is incorrectly compared and used as a substitute for a *surface water standard.***

  Contaminated surface water and groundwater each pose different human and ecological pathways of exposure and mobility. Because surface water contaminants often pose a more direct pathway of human exposure and travel further distances than groundwater standards, surface water standards are often at lower concentrations than groundwater standards. A 20,000 ug/L standard seems intentionally chosen to mislead one into believing comparatively "low levels" of 1,4-dioxane surface water contamination poses little risk to human health and the environment.

- The comparison of the chemical 1,4-dioxane utilizing a Michigan wildlife criterion for surface waters is also an inappropriate comparison since 0.4 ug/L is the NJ groundwater standard. The USEPA scientists and regulators utilize 0.35 ug/L as the level at which cancer risk criteria. A previous groundwater report by the firm Arcadis used the Michigan wildlife criterion as a basis for comparison and this present report simply repeats that comparison. California has set a screening level for water discharge permits (NPDES) of 3 ug/L, a standard that is intended to protect wildlife and human health. The USEPA standard of 0.35 ug/L is the standard that should be utilized in this report and the USEPA should require Cornerstone to amend the report to utilize the USEPA standard. Since the toxicity of 1,4-dioxane or its synergistic effects are not fully know it is unethical to use a standard that has no basis and is simply the largest number Cornerstone could pick out of their hat.

- In the data validation report portion of this extensive document, analyzed by Cadena, Inc. there are several questionable conclusions made about the usability of the data and quality control requirements. Cadena, Inc. contended on

page 5,535 that proper sampling protocol was not followed for GCMS SVOC method 8270-SIM with method 3570 prep and therefore "is NOT considered to be in compliance with standard method criteria." However, the Cadena fails to determine that quality assurance/quality control (QA/QC) requirements were not met in this report and that the data cannot be determined to be usable.

EPA has repeatedly claimed that 1,4-dioxane in the groundwater does not pose a significant threat to human health because "no one is drinking the groundwater at the site." The USEPA in close partnership with the NJDEP must conduct door-to-door surveys of Ringwood residents, particularly Upper Ringwood families, many of whom are members of the Ramapough Lenaape Native American Tribe. These families are at greatest risk due to long-term exposure to unacceptable exposure to site-related contaminants resulting from living, recreating, and subsidence hunting on this 500-acre Superfund site.

Lead:

The continued presence of lead in the water samples confirms that the lead has an ongoing source. The report indicates that a single result of 3000 ug/L was measured in unfiltered water from the mine air shaft. This result needs further investigation and confirmation for several reasons:

- The 3000ug/L exceeds any standard and needs to be confirmed. Because the result came from unfiltered water that contains suspended particles in the water and lead was not elevated in filtered water, the report concludes that the lead was attached to particulate matter/sediment. This conclusion can and should be verified.

- The sample needs to have lead measured in unfiltered water, in the filtered water and in the filtrate. The lead concentration needs to be reported on mass (weight) for sediment to determine the lead levels in source materials.

- If, as the report suggests, the lead is associated with or bound to suspended sediment, then the suspended sediment needs to be characterized in order to identify if the source material is waste, contaminated soil, native soil or something else.

Volatile Organic Compounds:

- VOCs are volatile organic compounds that evaporate in air. ***VOCs present in the surface water samples indicates an actively discharging source of those VOCs is often in proximity – close enough that the VOCs have not yet volatilized.***

- Chains of custody for the samples were seemingly completed in a hurried and sloppy manner. On Chain of Custody #460-128037, VOC sampler Daniel Wheeler for Cornerstone Environmental Group and Ford Motor Company mistakenly writes "2/7/16" on the chain, when the actual sampling date was February 7, 2017. Mistakes like these call into question the validity of the data, as the chain of custody is one of the most important documents for quality assurance/quality control protocol analysis.

General results:

This February 2017 sampling effort measured the concentrations of various organic chemicals plus some metals in groundwater, seep water and surface waters. Only one of the organic chemicals, carbon disulfide, found in the groundwater samples occurs in nature with any regularity. The other organic chemicals are either strictly man-made or occur in places such as deposits of crude oil.

- The report makes a point of comparing the results with the NJ water quality, drinking water, another state standard, or EPA standard. The report does not compare the results to naturally occurring levels, for the most part.

The two commonly found contaminants, 1,4-dioxane and benzene are present in these samples as a result of human activities. The presence of such chemicals in groundwater, seeps and surface waters is evidence of an ongoing source of contamination.

- Tentatively Identified Compounds (TICs) are organic chemicals that were not targeted for measurement and may be present in a sample (water, air or soil) at low concentrations. NJDEP regulations define a TIC as:

  "Tentatively identified compound" or "TIC" means a non-targeted compound detected in a sample using a GC/MS analytical method which has been tentatively identified using a mass spectral library search. Alkane compounds attributed to a petroleum product will be summed and reported as total alkanes. For purposes of

TIC identification, the total alkanes are treated as one compound. An estimated concentration of the TIC is also determined."

The sample results in the report indicate that there were 15 TICs that could be named as well as 1 unknown TIC. These include 8 different benzene compounds, consistent with the widespread presence of benzene in groundwater.

TICs present a challenge because agencies do not usually include these chemicals in the estimates of exposures of people or ecological resources to toxic chemicals. As a result, it is possible that TICs may exert harmful effects that are not accounted for or considered in the risk assessment. In the present case, these TICs may be affecting human and ecological receptors.

Reporting Limits:

Reporting limits (RLs) on the measurement of chemicals in environmental samples are set by the private laboratory that conducts the measurements, not by an agency. EPA sets official methods used to measure various chemicals and at that time, EPA determines the lowest concentrations that can be accurately measured by the official method. This official limit is the detection limit and is the only limit that is determined by the EPA. EPA seeks to set detection limits as low as the method can accurately, reliably and repeatedly measure the chemical in question. When the laboratory undertakes to measure a chemical, the lab may agree to measure that chemical at concentrations all the way down to the official detection limit. But the laboratory may set a higher concentration that they agree to measure in the samples, under the conditions in the lab. This higher limit is the RL and many times the entity that pays for and contracts the sampling work is responsible for agreeing to or accepting the RL, or not.

When a RL is set at a higher concentration than the detection limit, and the sample results are less than the RL, the data is reported as either "qualified," or "not detected." **Therefore, a contaminant's designation as either "qualified" or "not detected" does not mean that the contaminant is not present in the sample, nor is not at a level that may have an adverse affect on human health or the environment.**

The reporting limits for some chemicals in the groundwater report were set at concentrations higher than the detection limit, reportedly due to dilution. The report indicates that measurements of metals in some samples were affected by this factor, yet it is not clear what error was introduced or what consequence resulted.

Recommendations:

- According to EPA's document titled *A Guide to Principal Threat and Low Level Threat Wastes*, "Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur." The three species of paint sludge dumped onsite by Ford Motor Company must be classified as individual principal threat wastes, as they are the primary sources of contamination. (See attached memo)
- Due to substantial technical discrepancies and inaccuracies in the quality assurance/quality control (QA/QC) of the data as discussed previously, particularly with 1,4-dioxane, all groundwater, surface water, mine water, and seep locations must be resampled and analyzed following proper field and lab protocol.
- Due to the inherent variability in groundwater samples and past sampling-related issues, ***future groundwater sampling events should take place monthly for at least the next year, and should be split with the USEPA and potential third-parties.***
- 1,4-dioxane should be listed as a groundwater contaminant of concern, as it is widespread onsite and often exceeds NJGWQS by orders of magnitude. 1,4-dioxane is reasonably anticipated to be a human carcinogen (Department Health and Human Services). Considering the high concentrations discovered onsite, the lack of knowledge with regards to 1,4-dioxane's human health and ecological risks (the contaminant is currently being re-analyzed under 2016 TSCA reform), and the fact that the Wanaque Reservoir serves as a source of drinking water for over two million New Jersey residents, the precautionary principle must be followed and all steps must be taken to ensure human health and the environment are protected. All concerns raised in the May 2017 North Jersey District Water Supply Commission must be fully addressed.
- USEPA must create a technical fact sheet for the February 2017 groundwater, mine water, and surface water sampling activities in an easily digestible form to increase public participation and understanding of onsite sampling activities and results, especially as the Ringwood CAG is newly reformed in June 2017. This report is over 5600 pages long, is unorganized and convoluted, and difficult to understand.
- EPA must announce to the CAG in writing when new technical or regulatory documents are to be posted on the online Ringwood Mines Superfund Site documents repository, and provide the public with a comment period of at least 30 days before the document or report is finalized.