SUBMITTAL FOR:

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
34 FREEMAN'S BRIDGE ROAD SITE
SITE NO. 4-47-028 (RCC #D005813)

TOWN OF GLENVILLE, NY

INDIRECT LTTD WORK PLAN
MANAGEMENT OF SOLID ORGANICS

SUBMITTAL 1.1 (DRAFT)

SUBMITTED TO:

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1.0 Technical Overview

This Indirect LTTD Work Plan amendment is proposed in response to differing site conditions on the site which have resulted in an unforeseen volume of solid organic material occurring in the feed soil of the LTTD plants. In particular, the indirect plant (i.e. TD*X) has experienced and will continue to experience significant impacts to the cost and efficiency of soil treatment operations due to condensable solid organics. As discussed herein, the condensed solid organics can result in critical fouling of the oil recovery system. The quantity of recoverable organic is higher than anticipated and this also impacts the cost and efficiency of soil treatment operations.

Evidence of this solid organic material has also been observed at the direct plant (i.e. ESMI) and has resulted in high levels of BTU loading in the system. This amendment does not address any mitigation measures that may be necessary to control BTU input in the ESMI feedstock.

For purposes of this submittal, the term 'solid organic material' refers to organic materials or wastes (including but not limited to tars, resins, paraffins, and other man-made commercial organic chemical compounds) which exist in a solid phase at ambient site temperatures.

*1.1 Summary of TD*X Shutdown*

The TSCA impacted site soils contain a substantial quantity of recoverable organic chemical compounds that are a solid at room temperature, and a viscous paste at 200°F (i.e. solid organics). During thermal treatment operations conducted on April 9-10, these materials condensed and accumulated in the TD*X indirect TDU requiring an immediate shutdown of the unit. The gas condensing system of the TD*X unit was then extensively cleaned to remove the large quantity of this solid organic matter.

At the time of the TD*X shutdown, the unit had been processing material from feed soil Bin #4 for approximately 12 hours. During this time 124 tons of soil was fed to the unit. This material was sourced from a pile of approximately 300 tons that was selectively excavated from cell F8 for the planned TD*X repeat PoP test runs. An inspection of the remnants of this pile was performed after the TD*X shutdown. This inspection confirmed the presence of a large fraction of essentially pure solid organic material that was estimated by visual observations to be greater than 50% by volume of the material in the remaining soil in Bin #4.

During prior operations at the FBR site, the TD*X unit has generated liquid organic condensate, and semi-solid scrubber cake and condensate filter cake. The organic condensate has had properties as expected, being a light organic phase liquid with viscosity similar to heavy petroleum distillate or lubricating oils. During processing of the F8 material, there was a sudden and obvious difference in the behavior of the gas treatment system. The scrubber phase separator blowdown, line, pump and centrifuge plugged with a non-pumpable viscous fluid. The condenser heat removal capacity was substantially reduced over a 1-2 hour time period and the condensate filter press plugged with non-pumpable material. These three problems could not be resolved and required an immediate shutdown of the plant.

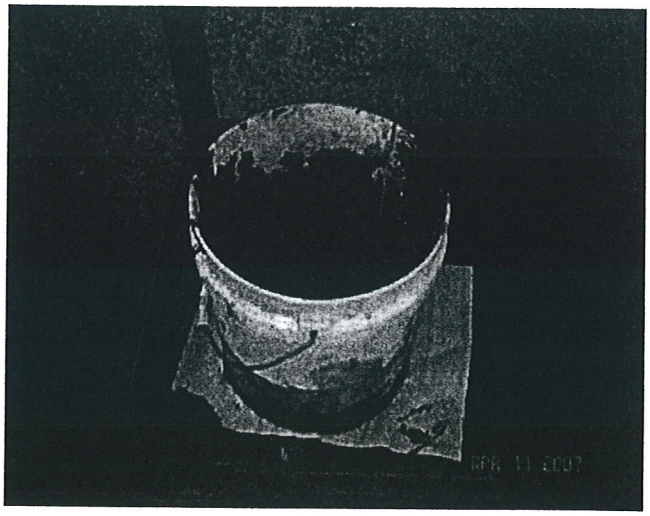
Upon completion of shutdown, the connection of the scrubber blowdown pump was broken, and the viscous material was drained into a bucket. A photo of this material appears below. This material was

an extremely viscous black organic sludge. When allowed to cool to ambient temperature, it solidified into an essentially pure black organic solid. There were little or no dust solids observed in this material.

After inspection, a program was initiated to clean out the gas system. During cleaning, careful observations were made to determine the extent and type of fouling. Further inspections and cleaning revealed extensive accumulation of this solid organic material throughout the TD*X gas system.

Measurements of the extent of contamination within the indirect system included:

- Approximately 8.6 tons of solid organic material was removed from scrubber and scrubber phase separator.
- 80 linear feet of blowdown piping was plugged with solid organic material.
- Approximately 1,600 lb. of solid organic material was removed from HX-1 vessel,
- 11,100 linear feet (2.1 miles) of ¾" tubing was fouled in the HX-1 condenser heat exchanger.
- The filter press chambers were blinded with solid organic material.



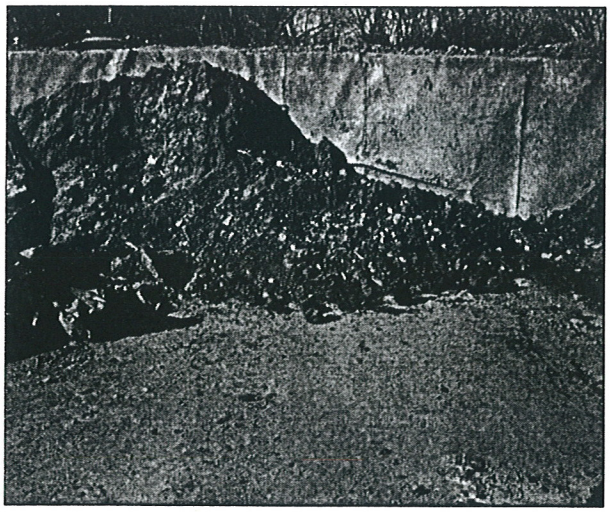
1.2 Additional Organic Recovery

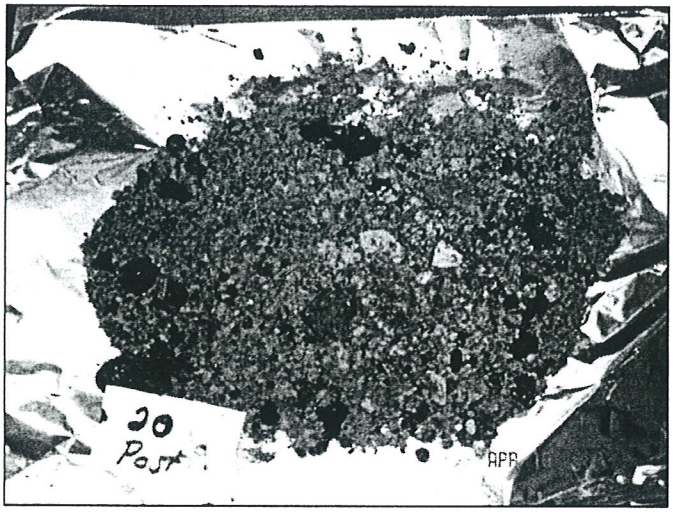
In addition to the gas system fouling, there has been a significantly greater quantity (5X increase) of this organic condensate recovered than was expected. TD*X used the site characterization data to estimate the volume of organic that was expected to be recovered (0.24 gallons per ton fed). This assumption was qualified in the LTTD Work Plan and the basis of the calculation can be provided upon request.

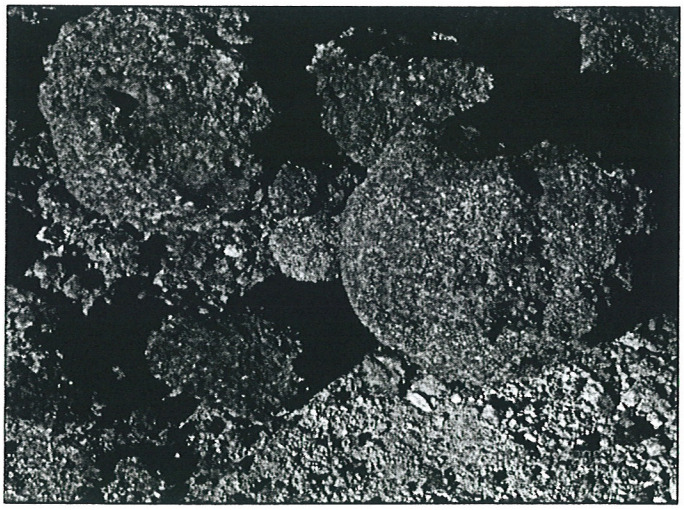
Based on soil treatment operations to-date, TD*X has recovered approximately 1.27 gallons of oil per ton of soil fed. While the properties of the organic condensate have been typical for the type of waste described in the bid documents, the condensate filter cake and scrubber centrifuge cake have had higher than typical oil contents. The scrubber cake has also exhibited some tendencies to foul the blowdown pump. However, as of Monday April 9, this fouling had not caused a forced shutdown of the system.

1.3 Photo Documentation of F8 Material

The F8 material in the following photos is composed of a significant quantity of solid organic material including organic balls of varying sizes and chip-like fragments of roofing material. These materials have the outward appearance of clay balls or stone fragments.. However, when broken open the material is composed of essentially pure black solid organic material. It is not readily apparent as to the chemical composition of this material. However, it appears to be a commercial chemical product with a mild aromatic odor typical of the BETX family of compounds. Samples of these materials were collected and sent to the Adirondack Lab for analysis and will be submitted as soon as they become available.







1.4 1.4 Impacts From Solid Organic Material

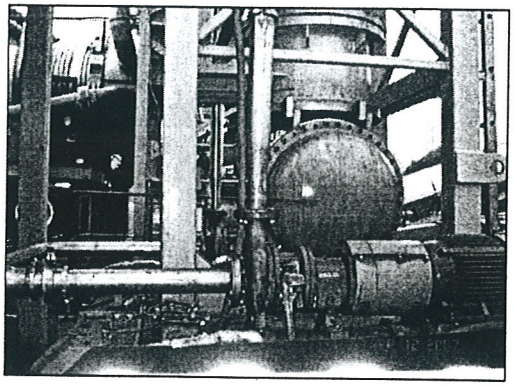
The presence of excessive amounts of solid organic material on the TD*X unit affect the unit as follows.

Accumulation of viscous material in the scrubber, scrubber phase separator, scrubber blowdown pump, and scrubber blowdown separator.

This condition quickly results in a shutdown of the TD*X unit. The scrubber loop must be blown down in order to purge solids from the scrubber system. Plugging of this system results in a required cleaning outage with a typical duration of 1-2 days.

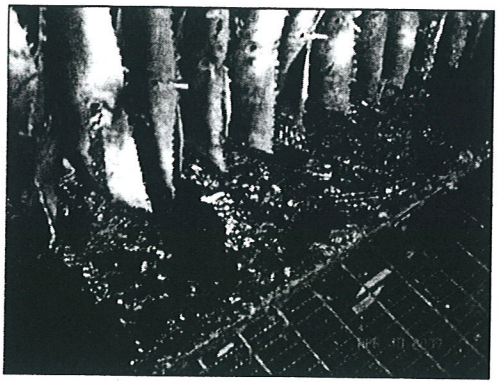
Fouling of primary condenser (HX-01) and primary condenser heat exchanger (HX-01A)

When the primary condenser heat exchanger fouls the ability to remove heat is reduced and the production rate for the unit suffers. Normal operations are not limited by the heat rejection capacity of the condensing system. When this occurs, the system is shut down and the heat exchangers are cleaned. This work can require 1-2 days.



Fouling of the condensate filter press

If the solid organic material passes into the condensate filter press, it can quickly foul its piping and filter cloths. Reduced capacity of the filter press can result in a plant shutdown to clean the press. Adding "body feed" to the press feed can mitigate this, but has not been thoroughly evaluated as of yet.



Increased labor and materials to clean the plant

Cleaning of the plant to remove the solid organic material is labor intensive and involves removal of the non-pumpable material from the vessels with manual methods. This consumes a large amount of materials including PPE and creates additional job control waste.

Increased water treatment materials consumption

The solid organic material may increase the oil content of the condensed water. This consumes additional filer media in the condensed water filtration system.

Inability to recycle scrubber filter cake.

The plan for the scrubber filter cake was to recycle this stream into the feed material. This is normally done for liquid organic waste projects because the scrubber cake will have a typical oil content of only 2-5%. Recycling the scrubber cake allows capture of its oil content in the organic condensate with minimal increase in oil recovery volumes. Due to the solid organic content, an unusual scrubber cake with greater than 20-50% organic content is produced. This material is sufficiently concentrated such that thermal separation is no longer appropriate and direct disposal is required. TD*X will evaluate establishing storage capacity on the pad for scrubber cake that cannot be recycled due to the presence of solid organic material. This material is most appropriately managed by blending with other TSCA debris or soil going for off-site disposal.

Inability to recycle condensate filter cake

Condensate filter cake is normally handled in the same way as the scrubber filter cake. The same problems apply to this material.

Reduced overall system availability

The presence of solid organic matter within the system will decrease the systems overall availability. The catastrophic fouling of the system provides an example of reduced availability. Even if catastrophic events are eliminated, increased fouling of components will lead to a decrease in the overall system performance.

2.0 Solid Organics Mitigation Plan

DAC and TD*X propose the following plan to mitigate the impacts of the solid organic matter at the indirect plant.

2.1 Solid Organics Processing Limits

Bulk solid organic materials should be visibly screened and excluded from the feed. There is no benefit to further concentration of essentially pure material. The TD*X unit is a soil treatment system used for the separation and collection of liquid organic constituents from a soil matrix. It is not a waste treatment unit for essentially pure waste materials or C&D debris.

(1) Asphalt road material, which is sand and gravel mixed with bitumen binder, should also be limited in the feed to the unit. Only minor amounts of asphalt should be fed. Bulk asphalt materials should be visibly screened and excluded from the feed.

(2) Asphalt roofing material is considered debris. Material greater in size than 2" should be excluded from the feed. Bulk asphalt roofing material should be excluded from the feed. Minor amounts of asphalt roofing, with less than 5,000 ppm equivalent binder concentration may be acceptable.

Maximum Recommended Solid Organic Matter in Feed: In order to keep from plugging the scrubber phase separator blowdown pump and centrifuge, the solid organic fraction should remain less than 33% of the solids in the blowdown, and preferably less than 10%. This makes the maximum solid organics feed rate to be 5,000 ppm at 10 ton/hr, and preferably less than 2,000 ppm.

2.2 Visual Screening & Segregation (Field)

Visual observations made by DAC during excavations will allow materials significantly impacted with solid organic matter to be immediately segregated. This material would be classified as debris laden soil and not amenable for thermal treatment. In lieu of pre-processing and thermal treatment, the debris laden soil would be excavated, temporarily stockpiled, and then sent off-site for TSCA disposal at Model City. This is consistent with the Work Plan and contract documents that state that debris and other deleterious materials will be removed from the LTTD feed soils and shipped off-site.

2.3 Visual Screening (Pad)

Visual observations made by TD*X during routine shift inspections would serve as a secondary visual screening method. Any materials identified by TDX personnel that are significantly impacted with solid organic matter would be classified as not amenable for thermal treatment and will not be processed through the plant. For example, the remaining soils originating from the F-8 excavation are not amenable for LTTD and would be segregated at this stage.

2.4 Melting Point Testing (Pad)

A simple field test is being evaluated to perform secondary screening of soil samples for high melting point solid organic materials. This method uses an oven to heat a sample and inspect the material for visible melted organic material. The method requires further field testing to determine its lower limit of sensitivity. Also, the temperature setpoint for the oven needs to be determined. An initial temperature setting of 250F seems prudent, based on the problems experienced with the scrubber. If a solid organic material liquefies below 250F, it will become a binder in the scrubber phase separator when it is cooled from 250F to about 180F. This test may not preclude a problem caused by a solid organic material with a higher melting point. Also, it is not known whether 5000 ppm or solid organic material is detectable visually with this test.

2.5 TSCA / Non-TSCA Segregation

TSCA soils which are determined to be not amenable for thermal treatment during any of the initial screening steps could be stockpiled and sampled at DEC's direction in order to identify any fraction(s) of the pile which may contain non-TSCA regulated levels of PCBs. Any soil which can be identified and segregated as non-TSCA regulated would be a viable candidate for direct LTTD at the ESMI plant.

2.6 Indirect LTTD Process Modifications

Solubility testing of the solidified organic material that drained from the scrubber phase separator indicated that it is soluble in equal parts of the organic condensate, or to a lesser extent soluble in diesel fuel but requiring significant agitation.

Recycling some organic condensate to the dryer feed hopper is recommended. This may help to render small amounts of bulk solid organic matter soluble and recoverable in the liquid oil phase. This may prevent plugging the scrubber system and/or fouling of the condenser heat exchange surfaces. Approximately 300 gal/day of oil recycle is recommended.

A small pump and recycle line are required, that TD*X can readily install. Oil recycling will put an additional evaporative heat load on the dryer, and may also reduce heat transfer coefficients from heating and cooling surfaces. This impact will not be known until operations are resumed.

A condensate water surge tank may be required to allow the plant operators time to respond to fouling of the equipment. Having additional storage tank capacity would reduce cleaning of the equipment containment areas after process upset conditions.

3.0 Notice of Differing Site Conditions

As stated in Section 1.0, the presence of significant quantities of solid organic material throughout the site is a differing site condition. The site characterization data presented in the bid documents and limited site data package did not accurately identify the pervasive presence of solid organic material nor did it provide any means by which such material could be quantified as part of a cost estimate.

The following information presents the basis for the differing site conditions.

3.1 Summary of Specifications & Data

Specification Section 01010, General

This part of the specification contains descriptions of the work and the site conditions. This includes a very important statement that relates to the type of organic materials that were:

- Characterized as being on-site
- Were anticipated to be provided to TD*X for indirect thermal desorption treatment
- Were planned for by TD*X in the treatment unit design and operating plan.

This statement is:

Based on the results of previous investigations, surface and subsurface disposal of liquid and oil chemical wastes, drummed wastes, and landfilling of construction and demolition debris have resulted in the disposal of hazardous wastes, including polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), and metals.

The section goes on with a similar summary narrative of the site conditions. At no point are bulk solid organic material wastes mentioned. It is presumed that this material was not known to be present on the site. Neither the project design nor the TD*X design and operating practices reflect the presence of bulk solid organic material wastes. Rather, both the site design and the TD*X unit design and operating plan were for solids and soil contaminated principally by liquid organic contaminants.

Limited Site Data. WRONG

There are descriptions of the site soils and debris materials in the test pit logs and boring logs in both the limited site data and the Pre-Design Investigation Report. These descriptions make frequent mention of soil types, as well as C&D debris. C&D debris is repeatedly described as brick, asphalt, concrete, metal and wood, with no description of solid organic material. It was further anticipated that the C&D debris would be removed in the pre-processing activities (screening) and disposed off-site. This assumption is fully supported by statements in Addendum 3 (Questions 28 & 34) and DAC's State-approved Work Plan which clearly indicate that all oversized debris coming off the Erin Fingerscreen would be segregated for disposal.

There is no indication of substantial, pervasive quantities of bulk organic solid material, of the type that was observed in the feed to the TD*X unit, or as is condensing and accumulating in the TD*X gas treatment system.

LTTD Specification, Division 13560

Section 1.03.A.4 contains an explicit requirement to develop feed management plans to manage soils heavily impacted with NAPL (non-aqueous phase liquids). There is no such requirement to identify, quantify or otherwise manage significant quantities of solid organic material. It is clearly apparent that the intent of the LTTD design was to manage organic liquids, not organic solids.

Section 2.01 D.1 also states that *Pre-Treatment shall include...material no larger than 2 inches in diameter which is otherwise compatible with the LTTD system.* As presented in Section 1.4, large quantities of solid organic material are not compatible with the indirect TDU oil recovery system.

Limited Site Data, RI Summary, Table 1

Analytical data are provided for VOCs, SVOCs and PCBs in surface and subsurface soils. These data are consistent in concentration ranges with contaminated soil. The levels do not indicate pure waste products for any of the constituent ranges. Average total contamination level is about 1,000 ppm when frequency of hits above the SCGs is considered, combined with the maximum values reported. None of the compounds are typical of bulk solid organic chemical, and when condensed in concentrated form they would be expected to result in a liquid oil.

3.2 Contract Modifications

DAC and TD*X are still evaluating the financial impacts of the TD*X shutdown and proposed Solid Organics Mitigation Plan. It is currently anticipated that the following elements will result in financial impacts:

- Forced outage starting on 4/10/07 / fouling of system components
- Increased operational costs (labor and materials) to maintain the plant and manage solid organic accumulation
- Increased water treatment materials consumption due to increased organic volumes
- Inability to recycle scrubber filter cake
- Inability to recycle condensate filter cake
- Reduced overall system availability
- Increased quantity of recovered oil sent for off-site disposal
- Off-site disposal of TSCA soil not amenable for LTTD
- Labor and analytical fees related to screening and characterization segregated materials

$100,000 ± cost for condensate

Further evaluation of these contract adjustments requires input from the DEC regarding the actual implementation of the Solids Organics Mitigation Plan.

- 70% TREAT
- 30% OFFSITE