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December 22, 1989

Mr. Richard Brazell, P.E.
New York State Department of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204-2400

RE: IRM Work Plan

Dear Mr. Brazell:

Enclosed is a Work Plan to conduct Interim Remedial Measures at the Clark site in Syracuse, New York. This plan is a revision to the plan originally submitted on September 29, 1989 to Frank Bifera and reflects the Department's request for a more focused work plan. I believe implementation of this plan would result in significant environmental benefits at this site.

Please feel free to contact me if you have any questions regarding this matter.

Sincerely,

DUNN GEOSCIENCE CORPORATION

Thomas M. Johnson
Associate Hydrogeologist

TMJ:ce
enclosure

cc: Director, Div. of Environmental Enforcement
Director, Div. of Hazardous Waste Remediation
Director, Bureau of Environmental Exposure Investigation
Frank V. Bifera, Esq.
Tom Male

INTERIM REMEDIAL MEASURES WORK PLAN

A. INTRODUCTION

- A.1 Interim Measures
- A.2 Adherence to Standards

B. IN-SITU SOIL TREATMENT

C. EXCAVATION AND EX-SITU SOIL TREATMENT

- C.1 Ex-Situ Treatment
- C.2 Contaminant Loads and Treatability
- C.3 Pumping Rates and Water Treatment
- C.4 Vapor Treatment
- C.5 Duration of Operations
- C.6 Operations Monitoring

D. OFF-SITE DISPOSAL

A. INTRODUCTION

In response to the letter received from the New York State Department of Environmental Conservation (NYSDEC) dated November 28, 1989, requesting additional information for the proposed Interim Remedial Measures Work Plan (IRMWP), Dunn Geoscience Corporation (DUNN) has prepared this report outlining the anticipated response actions to be undertaken as part of IRMWP for Site #734048 and areas affected by it (the "Site").

The purpose of the IRMWP is to describe the likely activities which will be performed to remove and treat materials at the site which can potentially adversely impact the environment and human health. Additionally, the Commissioner of NYSDEC had the authority granted to him by the Environmental Conservation Law to order that appropriate remedial measures by undertaken.

The IRMWP, submitted to the NYSDEC on September 29, 1989, outlined potential interim response actions to be undertaken for the Site. As a result of the installation and continued operation of the Terra Vac Pilot Study Work Plan and all amendments to it which have been approved by NYSDEC (PSWP), it has been determined that excavation of the contaminated soils (source removal) followed by necessary exsitu treatment of the excavated contaminated soils and soil flushing of remaining contaminated soils through groundwater pumping and treatment is an appropriate interim measure for the Site.

Specific measures anticipated, such as containment, water and vapor treatment, dewatering and ex situ vacuum extraction have already been approved by NYSDEC as part of the PSWP, and are presently being operated at the Site. These measures will continue to be operated in accordance with the PSWP as part of the IRMWP. A map showing these various elements of the pilot study is shown in figure 1.

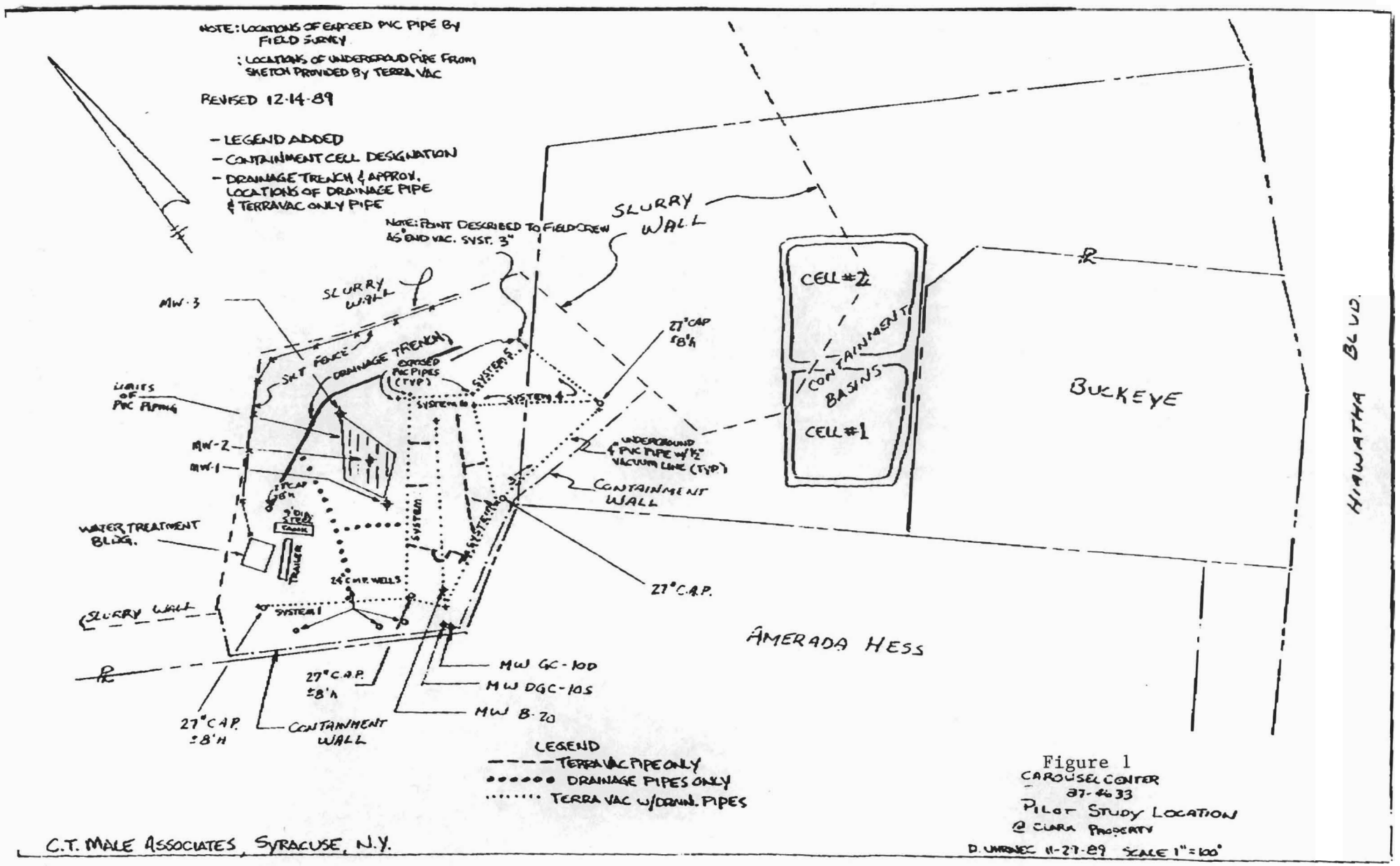


Figure 1
CAROUSEL CENTER
87-4633
PILOT STUDY LOCATION
@ CLARA PROPERTY
D. UMBENEC 11-27-89 SCALE 1" = 100'

C.T. MALE ASSOCIATES, SYRACUSE, N.Y.

The following sections describe the measures which are expected to be used at the site.

o Containment - This measure will be accomplished by isolating or removing VOC-contaminated sediments in the on-site ditch and by providing subsurface hydraulic isolation. The installation of a barrier wall system around the zone of contamination will isolate the on-site soils and groundwater. The groundwater within the barrier wall is being treated and discharged as part of the approved PSWP. This dewatering of the site will enable treatment of the site soils to occur because the presence of water interferes with the soil decontamination process (either in - or ex-situ). Additionally, as noted above, it results in the treatment of otherwise contaminated water. Both soils and water decontamination is occurring.

Groundwater pumping and treatment between the Hess property and the barrier wall around the Clark property will induce gradients toward the Clark property, thus halting any advance of the plume of contamination. These groundwater withdrawal wells have been installed and are being operated in accordance with the PSWP. The treatment system which has been installed for the work being performed under the PSWP is being operated to treat the water generated by this pumping to meet the applicable effluent standards for discharge.

This element is consistent with Goal 1 outlined in the IRMWP in that it prevents further degradation of off-site groundwater and, via a possible interconnection with the Barge Canal, potential degradation of off-site surface waters. Goal 2 of the IRMWP is accomplished by observing the appropriate worker health and safety requirements during implementation, as well as the technical requirements for surface water and atmospheric discharges. This element also is consistent with Goal 3 of the IRMWP, in that hydraulic isolation and groundwater withdrawal are an element of most remedial alternatives which will be under evaluation during the Feasibility Study (FS); hence, this element may be incorporated into a future long-term remedy of the site. Likewise, groundwater isolation poses little or no risk of interfering with potential long-term remedies under

evaluation. Goal 4 of the IRMWP is accomplished by implementing this element. Removal of groundwater and its treatment to acceptable concentrations before discharge is an effective remedial measure. It removes containments from the water prior to release of the water to the environment.

- Remove the On-Site Source of VOCs - This measure will be accomplished by continued on-site groundwater pumping to dewater the site and excavation and placement of soils in ex-situ treatment cells, and vapor extraction of the VOC-contaminated soils. The site has been surrounded with a barrier wall to reduce the recharge of water onto the site. Water withdrawal trenches have been constructed and wells installed inside the contained area to lower the water table inside the barrier wall. The withdrawn water is being treated in accordance with the PSWP. The lowering of the water table is necessary to allow excavation of the site soils. Dewatering is planned for ease of excavation. Horizontal pipes have been placed in the dewatering trenches. Excavation of soil containing VOCs will be undertaken following dewatering.

  This element is consistent with Goal 1 of the IRMWP in that it prevents further degradation of groundwater, surface water, and subsurface soil, and will provide significant cleanup and restoration of the environmental media. Goal 2 is accomplished by observing the appropriate worker health and safety and discharge requirements. This element is consistent with Goals 3 & 4 in that long-term remediation of the site will be achieved by removing the VOC source from the site.

- Treatment or Disposal of Excavated Soils - This measure will be accomplished by one of two means. One is on-site treatment of excavated contaminated soils. The other is the transportation of excavated contaminated soils to an off-site disposal facility licensed to accept the material. If on-site treatment is chosen, the contaminated soils will be treated in a lined cell with vacuum extraction pipes or other appropriate remediation alternatives or technologies to remove the VOCs. Gases, including the VOCs, extracted from the soil will be treated to remove sufficient materials to be in compliance with the PSWP. If off-site disposal

is chosen, the transportation, treatment (if required) and disposal of the soils will be in accordance with pertinent local, state and federal regulations.

During or prior to any excavation activities, the soil being excavated will be analyzed using a portable gas chromatograph. Soil with higher concentrations of VOCs will be segregated from those with relatively low VOC concentrations. The objective will be to first treat soils with the highest concentrations.

This measure achieves the interim measure goals as established in the following manner:

Movement of the contaminant source to an on-site or off-site controlled location reduces further degradation of the environment and hence, potential health and safety hazards.

Proper adherence to the health and safety plan during on-site activities will protect workers and the public at large.

Removal of the contaminated soils from the site and their placement in an on-site or off-site treatment or disposal facility may be the long-term remediation of the site and is consistent with future land use.

The on-going vacuum extraction pilot study has shown that VOCs may be removed from the contaminated soil using the proposed on-site treatment process.

A.2 Adherence to Standards

The interim remedy proposed for use at the site has the additional requirement to comply with the substantive requirements that govern releases. For remedial actions at the site these releases can occur via discharges to air or to water. Discharges to air can occur via releases into ambient air while undergoing activities on-site. The site Health and Safety Plan addresses safeguards to

personnel engaged in remedial actions on site. Operating process equipment may produce an air discharge stream. This air discharge stream will be treated and routinely monitored.

Discharges to water will occur for remedial actions which require contact with the groundwater. The treated groundwater will be discharged, directly or indirectly, to surface water bodies near the site. Treatment and discharge of withdrawn groundwater to adjacent surface water will require compliance with applicable discharge guidelines. The treatment system will be designed to comply with best available technology through the use of activated carbon or other appropriate water treatment system to treat groundwater prior to discharge.

B. IN-SITU SOIL TREATMENT

After completing the site hydrogeological characterization, it became apparent that VOC contamination was emanating from a source in the south portion of the Clark property. It was determined that volatilization using vacuum extraction could be effective in removing soil-VOC contamination prior to excavation. Terra-Vac has developed a system which, to date, is one of only two technologies which has successfully completed the demonstration phase of the EPA Superfund Innovative Technologies Evaluation (SITE) Program. Terra-Vac has been retained to utilize their vacuum extraction system, with appropriate modifications, at the site to implement soil treatment.

Results of a shelby tube bench test conducted by Terra-Vac indicate that the vacuum extraction process is applicable at the Clark property. During the test period, a 97% decrease in vapor concentrations occurred. Soil analysis showed a VOC concentration decrease from 108 ppm to 17.7 ppm for one sample and a decrease of VOC contaminants from 467 ppm to 0.2 ppm in a second sample. Dewatering of the soils is the key to a successful cleanup. The test showed VOC removals will be minimal during the dewatering, but will rapidly increase once the pore water has been extracted.

C. EXCAVATION AND EX-SITU SOIL TREATMENT

Excavation of contaminated soil for ex-situ treatment is an effective remedial measure. Excavation is expected to continue until concentrations of contaminants in the soils at the bottom of the excavation are acceptable, The use of a barrier wall which surrounds the contaminated soil, and dewatering will be necessary to allow for excavation below the natural water table.

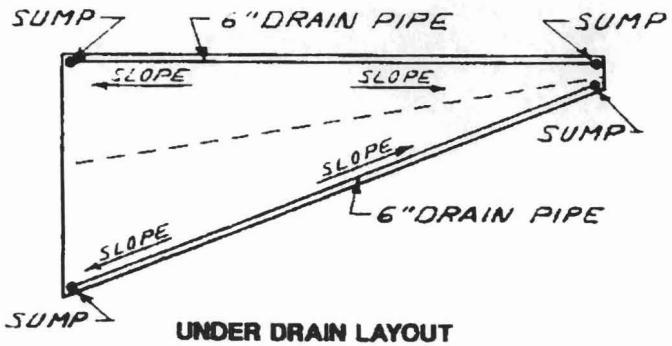
C.1 Ex-Situ Treatment

Ex-Situ Treatment consists of ex-situ VES treatment cells, groundwater withdrawal and treatment, excavation of contaminated soils and placement in the treatment cells, vacuum extraction of VOCs, and environmental monitoring. Other remedial options usable within the treatment cell will also be considered and may be used. VOCs which are present in these excavated soils can be extracted from the soil matrix to acceptable levels once these soils have been placed in a treatment cell (Figures 2, 3, and 4) in the vicinity of the excavation. The use of the Terra-Vac soil vacuuming system can then be employed without having to simultaneously, artificially suppress the water table as in the in-situ case to allow for air stripping of the VOCs from the soil.

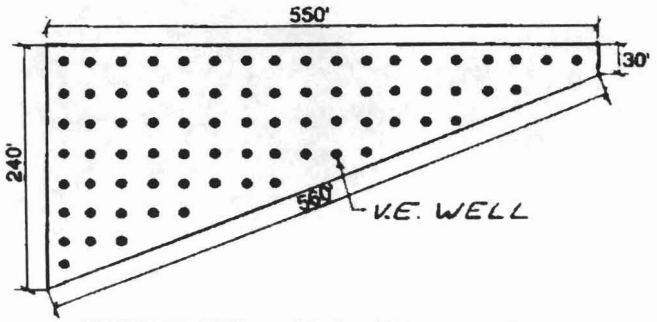
The groundwater withdrawal will take place, as necessary, to dewater the excavation - the cutoff wall will assist in isolating the excavation hydraulically. Groundwater removal has been undertaken since the start up of the Terra Vac Pilot Study. Additionally, dewatering is necessary to maintain the depressed water table, and if necessary, to further depress the water table in the excavation if required to proceed below the current water table.

Transportation of the excavated soils to the on-site treatment cell will be accomplished using trucks or other bulk transport systems (e.g. conveyors) which may be applicable. All transport will be accomplished in a manner consistent with the existing PSWP Health and Safety Plan and with concerns for the health and safety of on-site workers and the public at large.

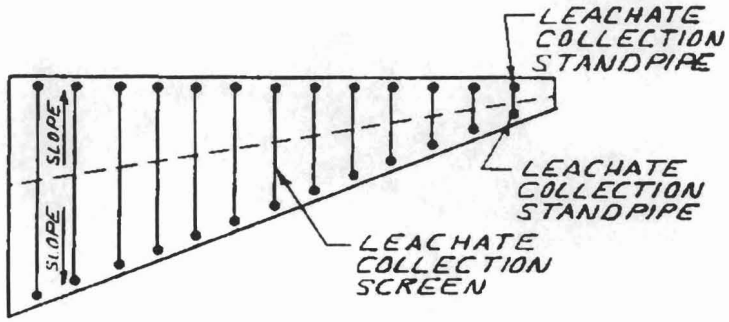
Each treatment cell will conceptually consist of an earthen berm with underliner, upper membrane seal, and a gravel drainage layer with embedded vacuum extraction pipes and drainage pipes. Contaminated soils will be placed loosely on



UNDER DRAIN LAYOUT



VACUUM EXTRACTION WELL LAYOUT



LEACHATE COLLECTION SYSTEM

Figure 2

REV.	DATE	DESIGN ENGR.	REMARKS

TERRA VAC

CLARK PROPERTY SOIL REMEDIATION

EX-SITU DESIGN

DWN. Sam A. Zamlon

SCALE Not To Scale

DWG NO. 88-416-2

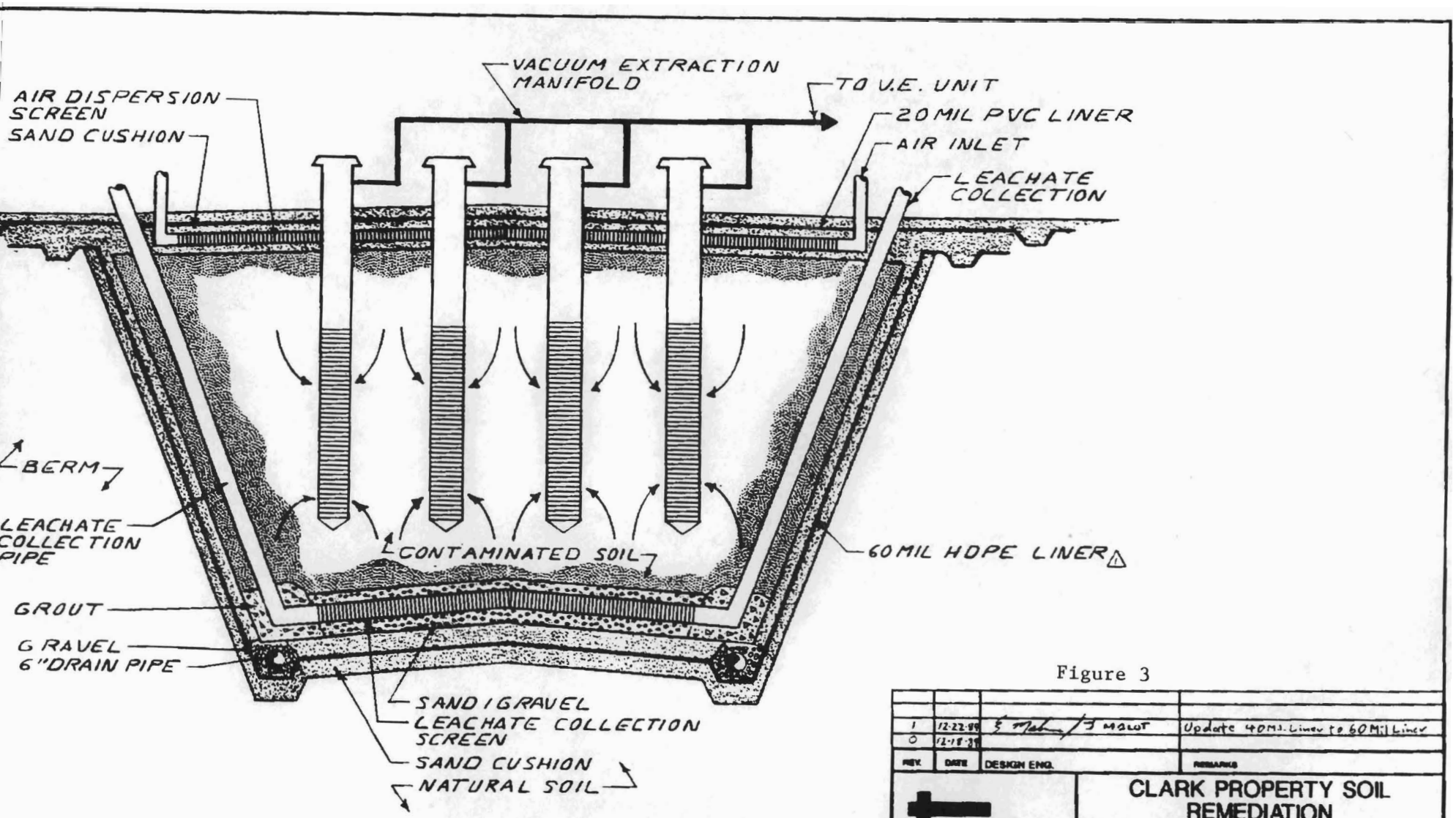


Figure 3

REV.	DATE	DESIGN ENG.	REMARKS
1	12-22-88	S Mah / J Malot	Update 40 Mil Liner to 60 Mil Liner
0	12-18-88		

TERRA VAC

CLARK PROPERTY SOIL REMEDIATION

EX-SITU TREATMENT CELL

DWN. Sam A. Zambon

SCALE Not To Scale

DWG NO. 88-416-3

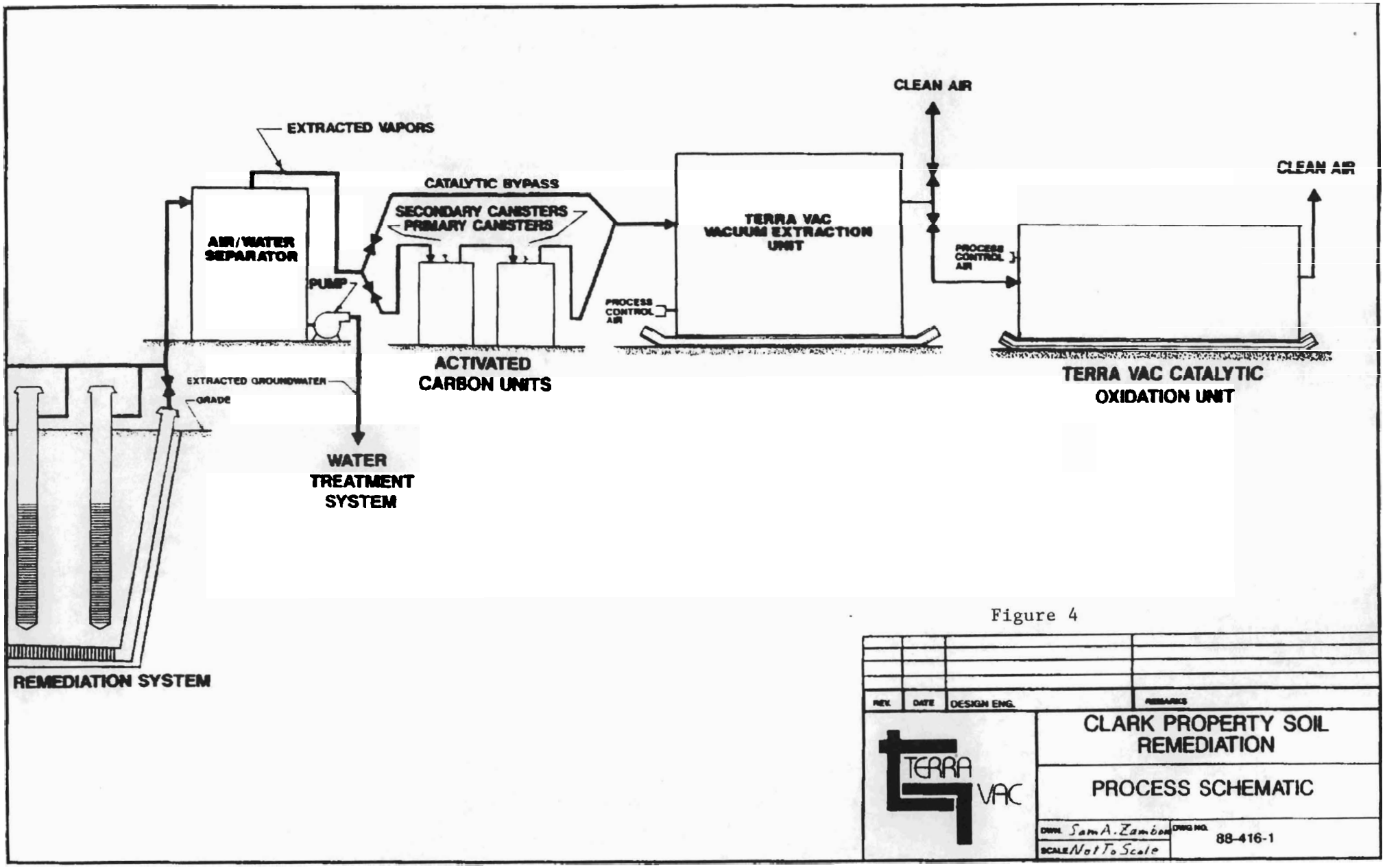


Figure 4

REV.	DATE	DESIGN ENG.	REMARKS

TERRA VAC

CLARK PROPERTY SOIL REMEDIATION

PROCESS SCHEMATIC

DWN. Sam A. Zambon

SCALE Not To Scale

DRG NO. 88-416-1

top of the gravel drainage layer, be vacuum treated in batches to an acceptable level, then removed from the cell. The water removed from the treatment cells as a result of dewatering soil-water (if any), and the vapor extracted from the treatment cells will be treated to levels as defined by the PSWP.

C.2 Contaminant Loads and Treatability

Contaminant loads in the treatment cell have been determined based on the soil and groundwater characterization presented in Dunn's September, 1988 report entitled "Hydrogeologic Conditions at the Clark Property". The soils are treatable using the VES as indicated in the progress report dated 21 November 1989 - "Terra-Vac Pilot Study; Interim Progress Report".

Groundwater pumpage during excavation-dewatering will cause a lowering of the groundwater level within the barrier-wall-contained area. The barrier walls prevent groundwater from adjacent properties from flowing onto the Clark property. The lowered groundwater level can be maintained using a lower pumping rate than if the containment wall were not installed. The water generated during excavation may be treated using adsorption of organics into activated carbon, as is being done during the pilot study, or may be accomplished by a different approvable method if so warranted.

C.3 Pumping Rates and Water Treatment

Dewatering would be required prior to excavation for this interim measure. Dewatering activities may continue during excavation to maintain the depth of the excavation above the depressed water table. **The pumping rates to achieve this level of dewatering are presented above (Section B.3).** The water removed during the dewatering of the site and water removed from the treatment cells (if any), will be treated to maintain a water quality within the allowable levels as defined by the PSWP. The water currently being removed from the site as part of the pilot study is being treated by adsorption of organics into activated carbon as described in the PSWP. Other treatment schemes are being considered and may be

implemented after being approved by the NYSDEC. Alternative treatment schemes include:

- o continued use of activated carbon but in less labor intensive volumes (bulk contactors instead of multiple 55 gallon drums), or
- o oxidation of the organics.

The actual carbon usage for treatment of the liquid phase for this interim measure has been determined during the initial phase of operation of the pilot study. The anticipated flow rates for dewatering the site are expected to be similar to those experienced during the pilot study. Currently, the average carbon usage is requiring the replacement of 10 - 165lb. carbon units approximately every 5 days. Future carbon usage is expected to be similar to this rate assuming flow rates and concentrations do not vary significantly.

C.4 Vapor Treatment

Soil gas being removed from the Clark site during the operation of the Terra-Vac pilot study is being treated using activated carbon for adsorption of organics. Other potential treatment schemes to remove the organics from the vapor removed in this measure are being explored. The Terra-Vac catalytic oxidation process has been approved by the NYSDEC as an alternative. This process may replace the use of activated carbon during the interim remedial measure.

Vapor phase carbon is being replaced based on daily monitoring of the vapors being discharged to the atmosphere from the VES stacks, On-site analysis of VES vapor discharges is being performed using a calibrated gas chromatograph. The analytical data is compared to calculated maximum concentrations allowable. Maximum allowable concentrations from any VES stack are calculated using Air Guide One methods and stated Allowable Ambient Levels (AAL). The controlling AAL is for vinyl chloride (0.4 ug/m ^{3}). Change out during the IRM will be performed when the stack data indicates it is necessary. It is expected that the above procedures being followed for the pilot study will continue to be followed as part of the IRM.

C.5 Duration of Operations

The duration of operation of this remedial interim measure will be determined by the performance monitoring described below (C-6). The intent of this measure will be to continue operation until concentrations of contaminants in the soil are reduced to acceptable levels.

C.6 Operations Monitoring

During the groundwater dewatering phase of this measure, the liquid stream discharge rate will be routinely monitored and recorded. Sampling of the liquid stream will be performed on a regular basis as it discharges from the treatment system in order to evaluate the quality of the discharge. On a less frequent basis, samples will be collected of the treatment system influent and also between the primary and secondary carbon units, if used. Breakthrough of the primary activated carbon canister, if used, will be monitored consistent with the monitoring plan established during the pilot study If necessary, as an alternative water treatment system is defined, a modification of the water monitoring program may be necessary.

Air emissions, if treated by activated carbon, will be monitored consistent with the monitoring plan established during the pilot study. The vapor phase sampling program may be altered if the vapor treatment process is changed.

In addition to sampling of the liquid and vapor stream discharges, samples of the excavated and treated soil will be collected in order to monitor the reduction of contaminant concentrations and to determine the effectiveness of the treatment.

D. OFF-SITE DISPOSAL

Alternatively to the use of ex-situ VES treatment, it may be necessary to remove the excavated soils from the site for treatment (if necessary) and disposal. The large quantity of contaminated soil for disposal would require bulk transport. Bulk transport is effective for transporting large volumes of waste material. If the off-site treatment or disposal facility were located along a waterway in the Syracuse area, barge transport may be feasible (because the Clark property is near

the Barge Canal and Onondaga Lake). Alternatively, bulk transport would be accomplished with trucks. All treatment (if necessary) and disposal will be accomplished in accordance with pertinent local, state and federal regulations.