March 11, 1992

Commissioner Leo Francis
Department of Public Works
#8 Sub Base, Crown Bay
St. Thomas, U.S. Virgin Islands 00802

Re: Request for Temporary Authorization of Ground-Water Discharge to Sanitary Sewer in the Tutu Area, St. Thomas, U.S. Virgin Islands.

Dear Mr. Restovic:

Pursuant to our previous correspondence and discussions, Geraghty & Miller, Inc. is formally requesting temporary authorization of a ground-water discharge to the sanitary sewer in Tutu, St. Thomas. Geraghty & Miller will be conducting a ground-water investigation in the Tutu area in accordance with a work plan which has been approved by the U.S. Environmental Protection Agency (USEPA). The objectives of the work plan are to delineate the potential sources, the horizontal and vertical extent, and the potential migration pathways of petroleum hydrocarbon products in soil and ground water in the vicinity of Route 38 within the Tutu Well Site (see Figure 1). The ground-water investigation will include the installation of ten shallow monitoring wells and seven deep monitoring wells. Approximately 45,000 gallons of ground water will be generated during the investigation, primarily during aquifer pumping tests and ground-water sampling. Figure 2 presents the layout of the proposed treatment system.

Prior to discharge, the ground water will be treated by airstripping and carbon adsorption to meet federal drinking water standards. Table 1 presents volatile organic compounds (VOC) levels detected during previous sampling rounds of two existing water supply wells (FW II and T-1) located in the center of the Tutu Wells site (see Figure 1). These data represent results from the sampling rounds conducted in September/October 1990, February 1991, and June 1991. The FW II Well and the T-1 Well are expected to be representative of the ground-water concentrations in the Tutu Wells Site. To develop the design basis (worst case) scenario, the

highest concentration of each constituent detected during sampling of the FW II Well and the T-1 Well was used as the influent concentration to the air stripper (Table 1) for CASE 1 (Figure 3). Since benzene, toluene, ethylbenzene, and xylenes (BTEX) may be present at higher levels than detected, the concentration of each was increased to 100 parts per billion (ppb) for CASE 2 (Figure 4). This modification provides a degree of conservatism such that if high concentrations of BTEX are present, the air stripper should be adequate to reduce effluent concentrations to discharge standards. Discharge standards shown in Table 2 have been established at USEPA Maximum Contaminant Levels (MCLs), or USEPA Maximum Contaminant Goals (MCLGs).

Calculations show that an air stripper tower design having a diameter of 1 foot, a packed height of 8 feet, and an overall height of 14 feet will be adequate to reduce the influent concentration to the required level. The packing used in the design was 1-inch Jaeger Tripacks (typical for a small diameter tower). The limiting constituent establishing the packed height is 1,2-dichloroethene at a level of 400 parts per billion (ppb). The predicted effluent concentrations are presented on Table 3 for the maximum influent concentrations (CASE 1) and modification for BTEX (CASE 2). The air discharge is calculated to be 0.005 and 0.008 pounds per hour (lbs/hr), respectively, for CASE 1 and CASE 2 on Table 3.

Flow rates to the air stripping system are expected to be the highest during aquifer pumping testing (10 gpm). Therefore, a design flow of 15 gpm was selected for the air stripping system. The process flow involves discharge from the wells to a feed tank, through the air stripper, carbon adsorption units, discharge line, and finally to the sanitary sewer. Figure 3 shows the process flow for CASE 1 and the discharge rate of the constituents in pounds per hour to the feed tank, atmosphere, carbon adsorption units, and sanitary sewer. Figure 4 shows the same information for CASE 2.

The water treatment system will be located at the Esso gasoline station, on Route 38, in the Tutu area (see Figure 2). Construction of the water treatment system is anticipated to start in mid-May 1992. Ground-water will be pumped from proposed Monitoring Wells MW-10 and

MW-10D to determine aquifer characteristics (see Figure 2). Operation of the water treatment system will occur infrequently through November 1992 (see Table 4). At least two samples (one influent sample and one treatment effluent sample) will be collected and analyzed for volatile organic compounds using USEPA Method 524.2 during each operation of the treatment system to document the effectiveness of the treatment system.

The temporary discharge piping will be installed in compliance with Occupational Safety and Health Administration (OSHA) regulations. Signs and physical barriers (e.g., caution tape) will be installed as needed to minimize physical hazards associated with discharge piping in pedestrian pathway areas. In addition, discharge piping will be removed from pedestrian pathway areas when the system is not in operation.

If you have any questions or require additional information, please call.

Sincerely,

GERAGHTY & MILLER, INC.

Clinton Moffatt
Staff Scientist

Thomas V. Danahy
Senior Scientist/Project Manager

Daniel A. Nachman/TVD
Daniel A. Nachman
Vice President/Project Officer

Enclosure

c: May Cornwall, DPW
Mirko Restovic, DPW
Ana Gloria Ramos, TEIC

CM:gv
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Table 1. Summary of Detected Concentrations of Volatile Organic Compounds in Ground–Water Samples Collected from September 1990 to June 1991, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

CONSTITUENT	T–1 10/2/90	T–1FR 10/2/90	T–1 2/5/91	T–1 6/5/91	FW II 9/26/90	FW IIFR 9/26/90	FW II 2/5/91	FW II 6/5/91
Vinyl Chloride	17J	12J	7	5	–	–	–	–
1,2–Dichloroethene	280J	270J	200J	400DEJ	75J	61J	230D	130DJ
Chloroform	R	R	ND	0.9	–	–	–	–
Trichloroethene	56J	47J	36	72DJ	6J	4J	21	12J
1,1,2–Trichloroethene	R	R	ND	4	–	–	–	–
Tetrachloroethene	120J	98J	100D	180DJ	25J	18J	90D	34DJ
Benzene	32J	26J	27	3J	–	–	–	–
Toluene	R	R	1	0.8J	ND	ND	ND	ND
Ethylbenzene	R	R	1	ND	–	–	–	–
Xylene	–	–	–	–	–	–	–	–

Constituent concentrations in micrograms per liter [parts per billion (ppb)].

D Compound was quantified using a secondary dilution by USEPA method 624.
E Result is outside calibration range.
J Result was detected below the reporting limit or is an estimated concentration.
R Result is unusable and rejected.
FR Sample ID suffix denotes Field Replicate of previous sample.
ND Compound not detected.
– Compound not measured.

PR01301–#2/tututbl1.wk3

Table 2. Design Basis Scenario Influent Constituent Concentrations, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

CONSTITUENT	CASE 1 MAX INFLUENT CONCENTRATION	CASE 2 MODIFICATION FOR BTEX	MCL/MCLG
Vinyl Chloride	17	17	2
1,2–Dichloroethene	400	400	5
Chloroform	1	1	N
Trichloroethene	72	72	N
1,1,2–Trichloroethene	4	4	3
Tetrachloroethene	180	180	N
Benzene	32	100	5
Toluene	1	100	1000(a)
Ethylbenzene	1	100	700
Xylene	–	100	10000

Constituent concentrations in micrograms per liter [parts per billion (ppb)].

N No proposed MCLs/MCLGs.
– Compound not measured.
(a) Final Rule (effective July 1992).

PR01301–#2/tututab.wk3

Table 3. Effluent Concentrations for Design Basis Scenario with 1 Foot Diameter Tower and 8 Foot Packed Depth, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

CONSTITUENT	MAX INFLUENT CONCENTRATION	CASE 1 EFFLUENT CONCENTRATION	% REMOVED	MODIFICATION FOR BTEX	CASE 2 EFFLUENT CONCENTRATION	% REMOVED
Vinyl Chloride	17	0.1	99.6	17	0.1	99.6
1,2–Dichloroethene	400	4.5	98.9	400	4.5	98.9
Chloroform	1	0.0	97.6	1	0.0	97.6
Trichloroethene	72	1.0	98.6	72	1.0	98.6
1,1,2–Trichloroethene	4	0.3	91.5	4	0.3	91.5
Tetrachloroethene	180	2.5	98.6	180	2.5	98.6
Benzene	32	0.5	98.6	100	1.4	98.6
Toluene	1	0.0	98.3	100	1.7	98.3
Ethylbenzene	1	0.0	98.0	100	2.0	98.0
Xylene	–	–	–	100	2.0	98.0

Constituent concentrations in mircogram per liter [parts per billion (ppb)].

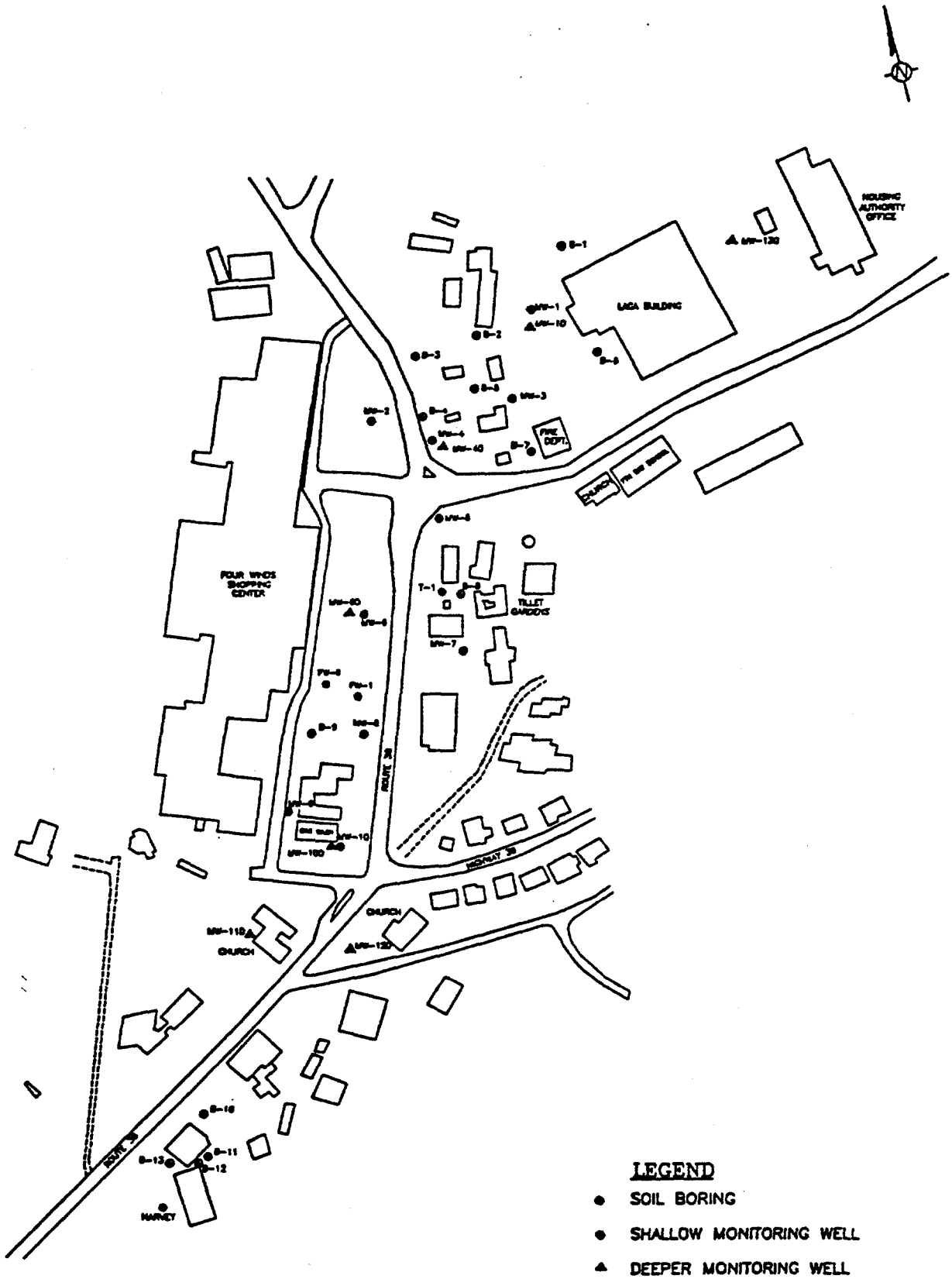
Air Stripper: 1 foot diameter, 8 foot packed depth, 14 feet overall height.
Flow is 15 gallons per minute (gpm).
Liquid Loading Rate is 19.1 gallons per minute per square foot (gpm/sqft).
Air to Water Ratio is 30 (volumetric).
Air Rate is 60 cubic feet per minute (cfm).
Temperature of influent is 84.5 degrees Fahrenheit (F).
Packing is 1 inch Jaeger Tripacks.
Limiting compound is 1,2–Dichloroethene.

Table 4. Schedule of Ground–Water Discharges, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

Weeks from Project Start (Expected Start Date March 2, 1992)	Activity	Estimated Volume of Generated Ground Water (gallons)
13–15 (July 2 – July 16) *	Monitoring Well Development	5,900
17–18 (July 30 – August 6) *	Monitoring Well Purging – Sampling Round I	3,000
21–22 (August 27 – September 3) *	Step Tests and Pumping Tests	33,100
31–32 (November 5 – November 12) *	Monitoring Well Purging – Sampling Round 2	3,000
	Estimated Total =	45,000 gallons

* Dates are approximate.

PR01301–#2/sgwd.123



NOT TO SCALE

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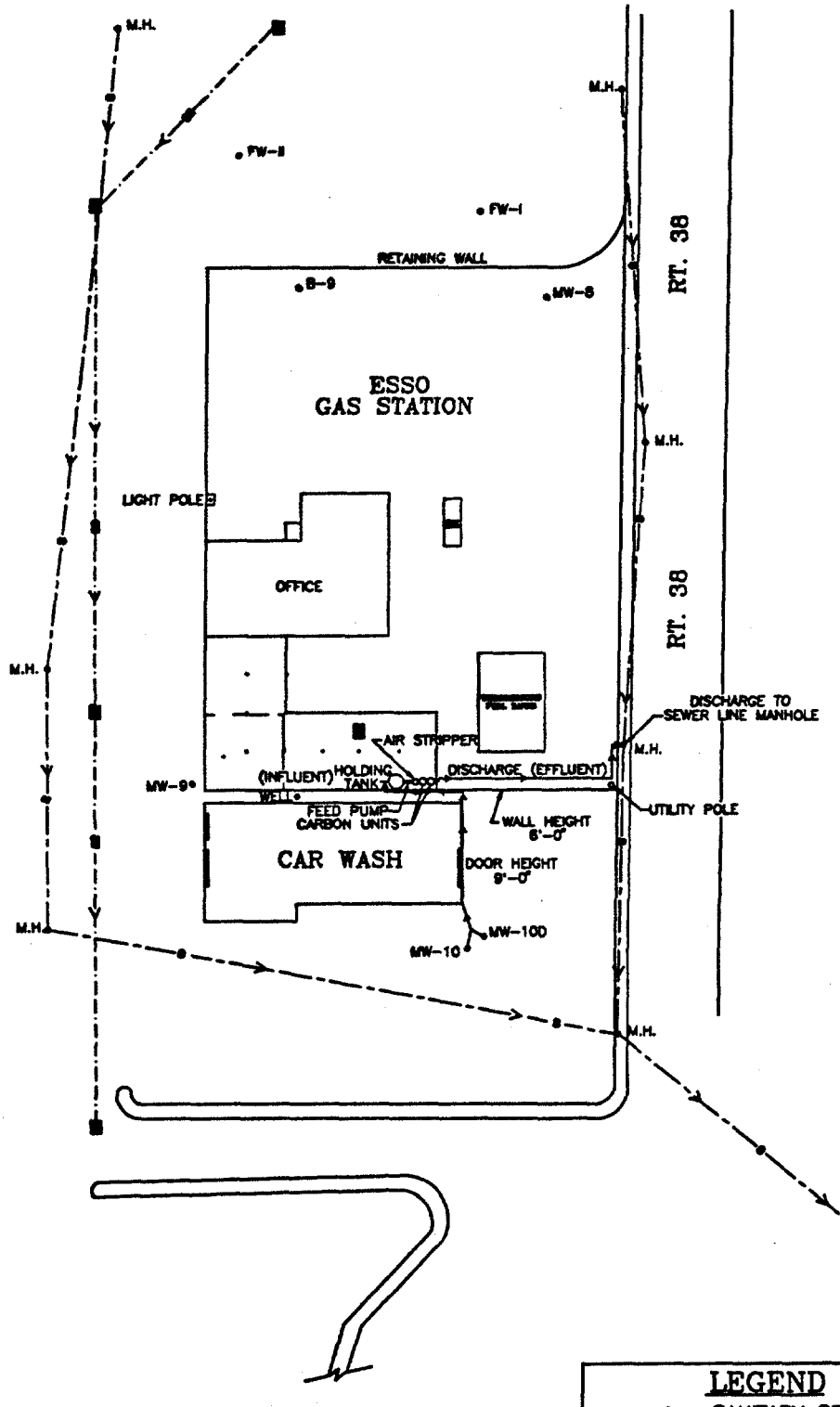
SITE PLAN

TUTU SERVICE STATION INVESTIGATION
TUTU, ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE 1



LEGEND

- SANITARY SEWER LINE
- STORM SEWER LINE
- M.H. SANITARY SEWER MANHOLE
- STORM SEWER CATCH BASIN

SCALE 0 40 FEET

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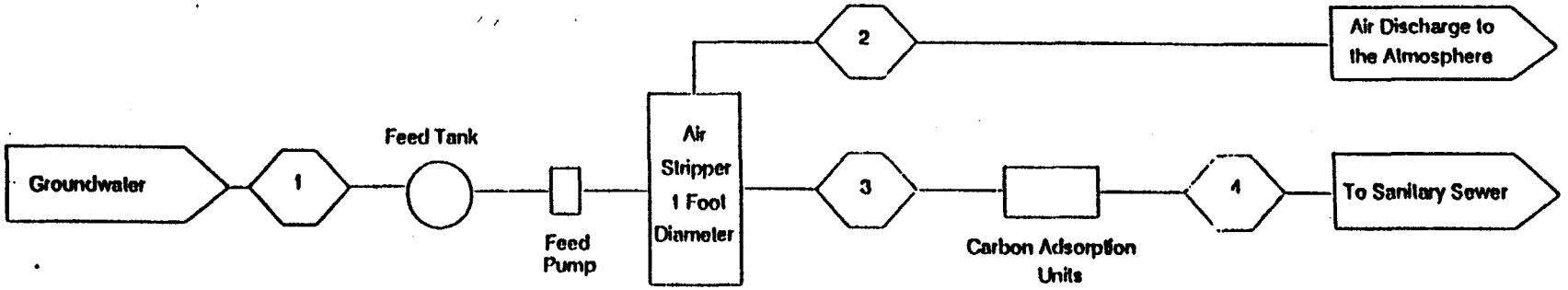
WATER TREATMENT SYSTEM LAYOUT

TUTU SERVICE STATION INVESTIGATION
TUTU, ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE 2

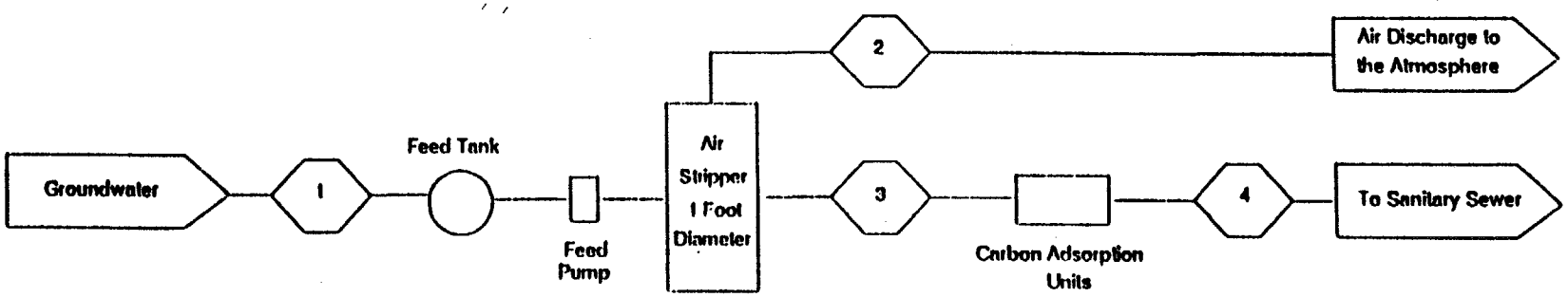
Figure 3. Process Flow Diagram for CASE 1, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.



CONSTITUENT	1	2	3	4
Vinyl Chloride	0.0001	0.0001	0.0	ND
1,2 Dichloroethene	0.003	0.003	0.0	ND
Chloroform	0.00001	0.00001	0.0	ND
Trichloroethene	0.00054	0.00053	0.00001	ND
1,1,2 Trichloroethene	0.00003	0.000028	0.000002	ND
Tetrachloroethene	0.00135	0.00133	0.00002	ND
Benzene	0.00024	0.00024	0.0	ND
Toluene	0.00001	0.00001	0.0	ND
Ethylbenzene	0.00001	0.00001	0.0	ND
Xylene	--	--	--	--
Total	0.0053	0.005	0.0003	ND

Constituent concentrations in pounds per hour (lbs/hr).
Ground water flow is 15 gallons per minute (gpm).

Figure 4. Process Flow Diagram for CASE 2, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.



CONSTITUENT	1	2	3	4
Vinyl Chloride	0.0001	0.0001	0.0	ND
1,2 Dichloroethene	0.003	0.003	0.0	ND
Chloroform	0.00001	0.00001	0.0	ND
Trichloroethene	0.00054	0.00053	0.00001	ND
1,1,2 Trichloroethene	0.00003	0.000028	0.000002	ND
Tetrachloroethene	0.00135	0.00133	0.00002	ND
Benzene	0.00075	0.00074	0.00001	ND
Toluene	0.00075	0.00074	0.00001	ND
Ethylbenzene	0.00075	0.00073	0.00002	ND
Xylene	0.00075	0.00073	0.00002	ND
Total	0.00809	0.008	0.00009	ND

Constituent concentrations in pounds per hour (lbs/hr).
Ground-water flow is 15 gallons per minute (gpm).