

Erler & Kalinowski, Inc.

Consulting Engineers and Scientists

1730 So. Amphlett Blvd., Suite 320
San Mateo, California 94402
(415) 578-1172
Fax (415) 578-9131

11 January 1996

Mr. Leonard Reid
Mr. David Rosoff
U. S. Virgin Islands
Department of Planning and Natural Resources
Nisky Center, Sutie 45A
St. Thomas, U.S. Virgin Islands
00802

Subject: Proposal for Disposal of Drums Containing Solid
Drilling Spoils with Low Levels of Petroleum
Hydrocarbons at the Bavoni Landfill,
Tutu Texaco Service Station,
St. Thomas, U.S. Virgin Islands
(EKI 940058.01)

Dear Sirs:

At present, there are 27 55-gallon drums containing solid drilling spoils at the Tutu Texaco Service Station in St. Thomas, U.S.V.I. At the request of Texaco Caribbean Inc. ("TCI"), Erler & Kalinowski, Inc. ("EKI") has prepared this letter to propose that these materials be disposed at the Bavoni Landfill on St. Thomas.

Results of analytical testing of three solid samples from the drums were reported to the Department of Planning and Natural Resources ("DPNR") in an earlier document entitled *Analytical Testing Results from Drum Sampling Activities at the Tutu Texaco Service Station* (Texaco Caribbean Inc., 3 February 1995, attached).

With the exception of hazardous waste criteria for specific petroleum hydrocarbon constituents, State and Federal standards for disposal of solids containing petroleum hydrocarbons in landfills are not available. The concentrations of petroleum hydrocarbons in solids that are accepted by landfills varies from landfill to landfill. For example, soil containing petroleum hydrocarbons is often used as daily cover in landfills in California.

In the absence of a standard for petroleum hydrocarbons, EKI reviewed soil cleanup standards for petroleum hydrocarbon release sites across the United States and performed a hypothetical risk analysis for potential human exposure if the solids are disposed in the Bavoni Landfill. On the basis of this review, EKI has determined the following:

- (1) the levels of petroleum hydrocarbons in the solids are less than or within the range of soil cleanup standards used throughout the U.S. and
- (2) the petroleum hydrocarbon constituents in the solids should pose negligible health risk if the solids are disposed in the Bavoni Landfill.

This letter presents the review of soil cleanup standards and the risk analysis.

BACKGROUND

Petroleum hydrocarbons are complex mixtures of hundreds or thousands of discrete constituents, most of which have low toxicity. There are no Federal standards that specifically regulate the disposal of solids containing petroleum hydrocarbons; rather, the individual toxic components of petroleum hydrocarbons and chemical properties, including reactivity, corrosivity and ignitability are regulated. The toxic components that are regulated include polycyclic aromatic hydrocarbons ("PAHs"), benzene, toluene, ethylbenzene, and xylenes ("BTEX compounds"), and lead.

Results of sampling (Texaco Caribbean Inc., 3 February 1995) indicate the following:

- (1) toluene was detected in one of the three solid samples (sample DS-3) at a concentration of 0.0088 mg/kg;
- (2) xylenes were detected in two of the samples at a maximum concentration of 0.03 mg/kg (sample DS-2); and
- (3) lead was detected in two of the samples at a maximum concentration of 19 mg/kg (sample DS-2).

Benzene, ethylbenzene, and PAHs were not detected above the analytical detection limits in any of the samples analyzed (Texaco Caribbean Inc., 3 February 1995). Additionally, the samples were analyzed for the properties, reactivity, corrosivity, and ignitability (Texaco Caribbean Inc., 3 February 1995). On the basis of the results of this testing, the solids containing low levels of petroleum hydrocarbons and associated constituents are not a hazardous waste.

The solids contain low concentrations of total purgeable petroleum hydrocarbons ("TPPH") and total extractable petroleum hydrocarbons ("TEPH"), i.e., maximum

concentrations of 12 mg/kg and 870 mg/kg, respectively (Texaco, Inc., 3 February 1995). In addition, 1,2,4-trimethylbenzene, a petroleum hydrocarbon constituent, was detected at a concentration of 0.12 mg/kg in sample DS-3.

PETROLEUM HYDROCARBON CLEANUP LEVELS

In the absence of regulatory guidance on "acceptable" levels of petroleum hydrocarbons that may be disposed in a nonhazardous waste landfill, cleanup levels for petroleum release sites may be considered in determining "acceptable" disposal levels for a landfill. This comparison is conservative because cleanup levels represent the amount of petroleum hydrocarbons allowed to remain in soil after a site is remediated. Soil cleanup levels for TPPH, TEPH, and BTEX in most States and the maximum detected concentration in the Tutu Texaco Service Station samples are as follows (Soils, December 1994):

Compound	Range of State-Accepted Cleanup Levels (mg/kg)	Maximum Conc. Detected in Tutu Samples (mg/kg)
TPPH (e.g., gasoline)	50 - 1,000	12
TEPH (e.g., diesel)	100 - 2,000	870
Benzene	0.005 - 20	ND
Toluene	0.50 - 2,500	0.0088
Ethylbenzene	0.34 - 2,500	ND
Xylenes	0.70 - 2,500	0.03

Note: ND indicates not detected above analytical detection limit reported in Texaco Caribbean Inc., 3 February 1995.

The maximum concentrations of TPPH, toluene, and xylenes detected in the solid samples from the Tutu Texaco Service Station are below the range of State-accepted soil cleanup levels. TEPH concentrations, which ranged from 140 to 870 mg/kg in the three samples, are within the range of State-accepted soil cleanup levels. Because the petroleum hydrocarbons and measured constituent concentrations in the solids are less than or within the range of soil cleanup levels, the solids from the Tutu Texaco Service Station should not adversely impact conditions at the Bavoni Landfill.

Many States have cleanup levels for TPPH, TEPH, and BTEX that are based on a site-specific risk characterization (Soils, December 1994). Such a risk characterization may

include human health risk and/or chemical fate and transport modeling.

HYPOTHETICAL HUMAN HEALTH RISK EVALUATION

The human health risk to hypothetical Bavoni Landfill employees due to exposure to the solids containing petroleum hydrocarbons was estimated using standard U.S. Environmental Protection Agency ("U.S. EPA") risk assessment guidance and some site-specific assumptions. The risk analysis and the assumptions are summarized in Table 1.

Concentrations of petroleum hydrocarbons and constituents were conservatively assumed to equal the maximum concentration detected in the three solid samples from the Tutu Texaco Service Station (U.S. EPA, 1992a). Hypothetical landfill employees were assumed to be exposed to petroleum hydrocarbons in the solids via the following pathways (U.S. EPA, 1989):

- incidental ingestion of the solids;
- dermal contact with the solids;
- inhalation of volatile constituents (i.e., gasoline, toluene, and xylenes) volatilizing from the solids; and
- inhalation of fugitive dust containing non-volatile constituents (i.e., diesel).

The exposure assumptions for each of these pathways are presented in footnote 5 of Table 1. Assumptions that are site-specific or differ from those in U.S. EPA's *Risk Assessment Guidance for Superfund* (1989) are discussed herein.

The Tutu Texaco Service Station solids are assumed to be exposed at the surface of the landfill, where employees may directly contact the solids, for 6 months (0.5 year). The soil ingestion rate is assumed to equal 480 mg/day (U.S. EPA, 1991), a value developed for people engaged in yardwork, rather than the 50 mg/day value for typical commercial or industrial settings (U.S. EPA, 1989). The exposed skin surface area for dermal contact with the solids is assumed to equal 5,200 cm², the area of exposed legs, arms, hands, and head (U.S. EPA, January 1992) because landfill employees are likely to wear shorts and short-sleeved shirts.

In the absence of site-specific data regarding the physical characteristics of the landfill, U.S. EPA Region IX Volatilization Factors (U.S. EPA, 1 September 1995) are used to estimate volatilization of gasoline (as hexane), toluene, and xylenes.

Toxicity data, such as chronic reference doses for non-carcinogenic effects and carcinogenic slope factors, were obtained from U.S. EPA references (U.S. EPA, 1992b; U.S. EPA, 1995a; U.S. EPA, 1995b), as indicated in Table 1. In the absence of inhalation toxicity data, oral toxicity data are used.

On the basis of these assumptions, the non-carcinogenic hazard index and incremental lifetime cancer risks are calculated for each of the petroleum compounds detected in the solids (Table 1). The compound-specific values are summed to obtain the total estimated risks to hypothetical Bavoni Landfill employees. The total non-carcinogenic hazard index is estimated to be 0.21, which is less than unity (one), the level at which non-carcinogenic effects may occur. The total estimated incremental lifetime cancer risk is 5.8×10^{-9} , which is significantly less than the range of acceptable incremental cancer risks (10^{-4} to 10^{-6}), as recommended by the Federal government (40 CFR Part 300, Paragraphs 300.430(e)(2)(i) et. seq.).

Results of risk analysis show that if the solids from the Tutu Service Station are disposed in the Bavoni Landfill, the estimated risk is negligible for landfill employees in direct contact with the solids for 6 months.

As you know, TCI is planning to implement remedial measures at the Tutu Texaco Service Station in the near future. Removal and disposal of the drummed materials is necessary to allow site work to commence. TCI appreciates your review and attention to this matter.

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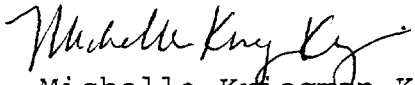
If you have any questions, please do not hesitate to call.

Very truly yours,

ERLER & KALINOWSKI, INC.



Carey E. Peabody, Ph.D., R.G.
Project Manager



Michelle Kriegman King, Ph.D.
Project Scientist

cc: Caroline Kwan, U.S. Environmental Protection Agency
Paul Ryan, Texaco Inc./ Texaco Caribbean Inc.
Tim Knutson, Texaco Inc./ Texaco Caribbean Inc.
John Zebedee, Hymes, Zebedee

Attachment

REFERENCES

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