BIOLOGICAL DEGRADATION PRODUCTS

As previously presented, the end-products of biological degradation are carbon dioxide, nitrogen gas and water. None of these end-products will interfere with the bioremediation process. The soil is sufficiently buffered by the added nutrients to handle the amounts of carbon dioxide produced.

AIR EMMISIONS

Recent studies of air quality within an indoor soil treatment facility substantiated that volatile organic compound emissions are negligible as would have been expected. Two water sprays are applied to the soil immediately as it exits the soil screen (nutrients and bacterial inoculum). Water sprays are an effective VOC and dust control measure as recognized by the U.S.E.P.A.. Subsequently, the soils are placed in windrows and covered with plastic to further minimize the loss of any volatiles. More importantly, volatiles are the most readily degraded compounds and are generally removed within 3 days after treatment with an average DRE of >98%.

An independent air monitoring study was performed on an indoor facility. The dimensions of the building are 160 feet wide by 400 feet long and 25 feet high. The soil receiving and BER processing areas are at one end and the side of the building with a footprint of about 25 feet by 80 feet. The remainder of the building is used for windrow treatment. The facility contained 5200 tons of gasoline and diesel contaminated soil that was already processed and standing in windrows. Additionally, approximately 700 tons of gasoline contaminated soil (average concentration of 3400 mg/kg) were stockpiled in the building and were being treated by the BER process during air monitoring. NIOSH Methods 1500 and 1501 were used for determining total hydrocarbons and aromatic hydrocarbons, respectively. Six air samples were taken. Three were in the immediate area of the soil processing area and three were from the area of the building holding the previously treated soils. Specifically, one sample was collected from inside the soil screen. The air samples are identified below.

Sample Number	Identification
1	Incoming soil truck unloading area
2	Inside soil shredder
3	Treated soil area next to processing area
4	Center of building
5	End of building most distant from processing area
6	Over incoming stockpiled soil pile

The results of the air monitoring were as follows.

Sample	Sample	Sample	Air Concentration (mg/m^3)*

Number	Time(min)	Vol(L)	Benz	Tol	Eth Benz	Xyl	Tot. VOCs
1	310	15.2	0.2	0.8	0.3	2.6	33.4
2	293	14.4	2.5	9.4	3.0	30.5	421.2
3	290	14.6	0.2	1.2	0.5	3.9	42.1
4	279	14.3	0.2	0.8	0.3	2.4	29.2
5	254	13.0	0.2	1.0	0.3	3.1	36.4
6	249	12.4	0.3	1.4	0.6	4.4	48.6
ACGIH TWAs (mg/m^3)			32	188	434	434	

*ppm = (mg/m^3) (24.45)/gram molecular weight of compound