

Cleanup at Mandirituba Power Sub Substation

During the later parts of 2006, the Mandirituba power energy substation has many incidents of vandal attack on the unused equipment. As a result more than 15 transformers were damaged and the soil contaminated with transformer oil (Figure 1).



Figure 1. Mandirituba Power sub Substation

Analysis of the soil showed high contamination with an average TPH of 7,847 mg of transformer oil for kg of soil extending to an area of about 500 m² (5382 sq ft). Moreover, the interval of significant time between the incident and the remedial action suggested percolating of the transfer oil into deeper layers of soil likely to affect the quality of the ground water. The Table 1 shows the values of TPH at the site results.

Table 1. TPH of the soil because of the incident.

Point	TPH in Surface (mg/kg)
1	8794
2	22777
3	7808
4	602
5	806
Average	
	8158

Table 2. TPH of soil at a depth of 1.5 meters

Points	TPH at 1.5 meter (mg/kg)
1	105
2	2021
3	86
4	47
5	0
Average	
	452

The utility company was responsible for the cleanup suggested on-site treatment as remediation method, without transporting high volumes of contaminated soil. It was recommended to use of bioremediation for the cleanup and AgroRemed BR CTBA developed with local microbial source was considered suitable in relation to the other methods of cleanup.

Bioremediation of the Contaminated Soil

The treatment of the Mandirituba power energy substation was initiated in February 2007, after the meeting with security guard and was similar to the Municipal Grounds at the Fazenda Rio Grande work. Treatment of soil was by excavation and since the total area and the depth were greater than the one before, it was decided to divide the area in squares and treat each square one after the other. The first square was excavated and this resulted in 10 piles/stacks of soil (Figure 2). AgroRemed BR CTBA was applied on each stack uniformly after taking the samples of soil before treatment (Figure 3).

At the end of 4 weeks, fresh samples from each stack were collected and sent to LACTEC for analysis. The results were very promising and the value of TPH was almost 500 mg/kg as required by the local regulations (Tables 3 and 4). The excavated soil was replaced in the ditches and monitoring of the soil will be continued till end of 2007. Total AgroRemed used was 800 liters for 1 square.

The work in the first square is almost completed and as mentioned above now treatment of second square will begin shortly.



Figure 2. Stacks of treatment.



Figure 3. Remediation of the Mandirituba stacks.

Table 3. Results of TPH in the stacks before the treatment.

MANDIRITUBA (Stack Before)	
Point	TPH (mg/Kg)
Mount 1	827
Mount 2	2492
Mount 3	527
Mount 4	1612
Mount 5	3507
Mount 6	142
Mount 7	412
Mount 8	858
Mount 9	3706
Mount 10	308
Average	1408

Table 15. Results of TPH in the stacks after 4 weeks of treatment.

MANDIRITUBA (Stacks After)	
Point	TPH (mg/Kg)
Mount 1	242
Mount 2	911
Mount 3	518
Mount 4	1117
Mount 5	988
Mount 6	618
Mount 7	320
Mount 8	194
Mount 9	335
Mount 10	127
Average	524