

**Project Completion Report:
Muthia Village Dumpsite, Ahmedabad**



Project Details:

| | |
|-----------------------|---|
| Location | Adjoining Naroda Industrial Area, Ahmedabad, India |
| Contaminant | Various Industrial Waste Products |
| Project Duration | January 2006—April 2008 |
| Project Cost | \$25,000 over two years |
| Implementing Partners | Concept Biotech, Vadodara, local governments, institutions, Naroda Industrial Association |

Performance Metrics:

| | |
|-----------------------------|--|
| Toxin | Industrial Effluent and Sludge |
| Affected Population | 85,000 |
| Exposure Standards | various |
| Levels Prior to Project | Nitrogen: 0.10% (soil); Potassium: 0.21% (soil); Phosphorous: 827.34 ppm (soil); Cadmium: 0.028 ppm (soil); Chromium: 41.28 ppm (soil) |
| Levels Following Completion | 80% reduction in all harmful materials in the soil, water, and plants of the area. Cadmium and Chromium at ND |

○ **Background and Scope:**

Muthia village lies on the eastern border of Ahmedabad City, adjacent to a major industrial estate operated by the Naroda Gujarat Industrial Development Corporation (GIDC). Approximately 60,000 tons of industrial waste has formed as a result of careless disposal from the effluent treatment plants over the last decade. These hazardous waste products had leaked into the groundwater, which turned a worrisome shade of red. Monsoon rains washed and spread the contaminated sludge over a very wide area.

Concept Biotech and the Society for Environmental Protection have been studying contamination in this village since 1996. Blacksmith funded the implementation of a three phase clean up, the last phase of which is the treatment of the site with vermiculture—worms—that concentrate heavy metals in their bodies, and reduce the contamination in the soil around them.

○ **Solution Implemented:**

Originally a site containing an estimated 150 tons of hazardous waste had been targeted for a pilot-scale intervention project. However, upon further examination, it was discovered that the pollution had permeated the soil deeper than initially been estimated, requiring excavation of the site. Heavy machinery and other equipment were brought in, and eventually removed 3,000 tons of hazardous wastes, which was later sent to a disposal facility operated by Naroda Environmental Projects Ltd. (NEPL). The costs of this unforeseen contingency were covered by local industries, who also contributed their services and effort to the project.

○ **Project Performance:**

Soil and Grass Sample Analysis Report, Prior to Clean Up

| Stated Sample Reference | Top Soil Layer | Sub-Surface Soil | Test Method |
|--------------------------------|-----------------------|-------------------------|-------------------------------------|
| Nitrogen (%N) | 0.10% | 0.06% | GAFTA-2003 (method4) |
| Potassium (%K) | 0.21% | 0.13% | By Flame Photometer |
| Phosphorous (P) | 827.34 ppm | 288.56 ppm | AOAC-2003 (995.11) |
| Cadmium (Cd) | 0.028 ppm | 0.034 ppm | Atomic Absorption Spectrophotometer |
| Chromium (Cr) | 41.28 ppm | 28.37 ppm | Atomic Absorption Spectrophotometer |

Muthia Soil Post-Clean Up/Treatment Activity, Year 1 (2006-2007)

| Sample Reference | Muthia Soil | Muthia Ground Water |
|-------------------------|--------------------|----------------------------|
| Cadmium | >0.05 ppm | <0.10 ppb |
| Chromium | 14.5 ppm | 0.90 ppm |
| Lead | 1.13 ppm | <1.00 ppb |
| Nickel | 8.2 ppm | 2.70 ppb |
| Zinc | Analysis not done | <0.01 ppm |

Muthia Soil Post-Clean Up/Treatment Activity, Year 2 (2007-2008)

| Sample Reference | Muthia Soil | Muthia Ground Water | Grass Sample |
|---------------------------|--------------------|----------------------------|---------------------|
| Available Nitrogen (N) | 0.0045% | | |
| Available Phosphorous (P) | 0.0117% | | |
| Available Potassium (K) | 0.0027% | | |
| Chromium (Cr) | 4.544 ppm | Undetected | 1.12 ppm |
| Lead (Pb) | Undetected | Undetected | 0.66 ppm |

○ **Outcomes and Follow Up:**

The first plot affected by dumping has been remediated with approximately 60% reduction in select heavy metals, though another round of decontamination was recommended. The second round of decontamination involved the distribution of some 400 liters of EM solution, followed closely by the introduction of 8 tons of vermin-castings and another 40 kg of worms. The result at the end of the second year have proven to be encouraging, showing even further reductions in the presence of heavy metals.

The site has been monitored quarterly to further assess the efficacy of this methodology through soil testing and analysis of plants in the area to test for the presence of heavy metals. This low-cost pilot bio-remediation method has proved highly effective in managing and treating the waste dumps statewide.