RevitaDirt

Remediation Pellets

Cost Effective • Eco-Friendly Remediation

Old Problem – A New Innovative Solution

- Traditional land remediation requires expensive soil excavation, trucking and disposal. A process that spreads, not solves the problem.
- RevitaDirt provides affordable remediation without costly excavation & removal, eliminating the spreading of contaminants. All at a significantly lower cost.
- RevitaDirt allows landowners to recapture the value of their land, while staying cost and eco friendly.

What is RevitaDirt?

- RevitaDirt is a 100% natural, biodegradable sorbent made from wood mill particles.
- This absorbent material instantly encapsulates and begins bioremediation of petroleum hydrocarbons.
- RevitaDirt is non-leaching, safe for incineration and can remain in-situ.

Field Testing Results – Oil Contaminated Soil

- Bench Test # I

- Random contaminated soil grab samples were collected from four land farm locations, identified as Area 01-04. Each land farm location has varying levels of contamination and age of contamination. In the first series of tests ,equal masses of contaminated soil were placed in mixing trays. RevitaDirt was then mixed with a patented solution in a separate container. RevitaDirt was allowed to hydrate for approximately two minutes before being thoroughly hand mixed with the contaminated soil. Contaminated soil was mixed with RevitaDirt at ratios of one to one and two-parts RevitaDirt to one-part contaminated soil. The test samples were kept activated for two days. The samples were then allowed to dry for one day. Representative grab samples were collected and submitted to a qualified laboratory for analysis of diesel range organics (DRO) and total extractable hydrocarbons (EPA Method 8015B).

Oil Contaminated Soil Continued

		1:1 Mix Ratio		2:1 Mixed Ratio	
Location	**Untreated DRO**	**Treated DRO**	**% Reduction**	**Treated DRO**	**% Reduction**
Area 01	110,000 mg/Kg	34,900 mg/Kg	68.3%	14,800 mg/Kg	86.5%
Area 02	8,360 mg/Kg	5,980 mg/Kg	28.5%	4,560 mg/Kg	45.5%
Area 03	11,300 mg/Kg	6,890 mg/Kg	39.0%	2,940 mg/Kg	74.0%
Area 04	8,550 mg/Kg	3,820 mg/Kg	55.3%	4,000 mg/Kg	53.2%

When evaluating the report data, it must be understood that EPA 8015B test methodology uses a solvent to extract hydrocarbons from the soil for analysis. Solvents will dissolve hydrocarbons upon contact. Therefore, the results provide an indication to the ability of RevitaDirt to retain absorbed hydrocarbons that would otherwise remain absorbed by RevitaDirt in the environment.

Results also indicate that product interaction with contaminated soil is critical. Visually, the product did not appear to have reached oil saturation during the tests. It may be inferred that some of the hydrocarbons extracted were from soil that did not receive complete mixing.

Oil Contamination Test #2

- In the second series of test, a new set of soil grab samples collected from the four land farm locations. The contact time between RevitaDirt and the contaminated soil was reduced to just two hours. The mix ratio was one-pound RevitaDirt to one-pound contaminated soil. Samples were collected and submitted to a qualified laboratory for analysis. For all testing every sample is red tape tamper sealed, the laboratory staff are the only personnel that can open the container. This helps to ensure that all tests are as accurate as possible.

Location	Untreated DRO	Treated DRO	% Reduction (1:1 Mix Ratio)
01	206,000 mg/Kg	63,800 mg/Kg	69.3%
02	25,100 mg/Kg	3,810 mg/Kg	84.8%
03	11,800 mg/Kg	4,430 mg/Kg	62.4%
04	8,490 mg/Kg	4,530 mg/Kg	46.6%

- Comparing the percentage of DRO reduction between the two series of tests, (see below), Areas 01-04 showed consistent contaminate removal percentages. Indicating that the absorption process occurs quickly, and that additional contact time will increase the amount of contamination removed from the soil. DRO removal percentages showed a considerable increase in the amount of DRO absorbed from the soil by RevitaDirt. The increased removal percentages may be due to changes in the chemical composition of the soil contamination. But as proper mixing is critical, the second series of tests most likely had complete product mixing with the contaminated soil.

	2 Hours	3 Days
Location	**Treated DRO Reduction**	**Treated DRO Reduction**
Area 01	68.3%	69%
Area 02	28.5%	84.8%
Area 03	39.0%	62.4%
Area 04	55.3%	46.6%

Lead Contamination Test

- We were provided a soil sample from a former shooting range undergoing site remediation. Residual lead pellets were removed from the soil, and a soil sample was collected to represent a worst-case scenario, soils near a target box. The base soil was analyzed for total lead and had a reported concentration of 13,400 mg/Kg (EPA Method 6010, Preparation Method EPA 3050).
- Three equal mass test samples of the base soil were prepared, each weighing one pound. Next, three varying portions of un-activated RevitaDirt were weighed. Test 1 contained equal amounts of RevitaDirt and contaminated soil. Test 2 contained two pounds of RevitaDirt to one pound of contaminated soil. Test 3 contained three pounds of RevitaDirt to one pound of contaminated soil. In each test, RevitaDirt was activated in a separate container. The RevitaDirt was allowed to activate for approximately two minutes before being mixed with the contaminated soil. After two minutes of mixing RevitaDirt with the contaminated soil, samples of the treated soil were sent out for laboratory for analysis.
- In addition to the three test samples, a sample of the untreated soil was submitted to our testing to the laboratory for a Toxicity Characteristic Leaching Procedure (TCLP) extraction and analysis. The results are summarized below. (Note: when testing for lead removal, this test was sent back three times to verify the results).

Lead Contamination Test Results

Mixture Ratio	TCLP Lead Concentration	% Reduction
Base	48.2 mg/L	-
Test 1 (1:1)	6.7 mg/L	86%
Test 2 (2:1)	2.7 mg/L	94%
Test 3 (3:1)	1.9 mg/L	96%

Collected data clearly shows RevitaDirt's effectiveness in lead removal from contaminated soil. Subsequent testing has indicated that applying RevitaDirt to the soil, then activating (soil washing) has better effectiveness in the time taken to reduce contamination in the soil. This is the method recommended for field use and application.

Industrial Sludge Testing

We were provided with a thick, black solution with a strong, pungent odor from the county landfill staff.

The sample was collected from a drain sump in former diesel technology training center shop. The solution had a high suspended solid content. The base liquid was analyzed for the "RCRA Eight" metals. Due to the high solids content, a 30/50 digestion was performed.

RevitaDirt was activated and added to a mixing vessel, which contained one pound of the liquid, until the liquid was completely absorbed. Approximately one pound of activated RevitaDirt was required to absorb the liquid. In this test, RevitaDirt was activated in a separate container. The RevitaDirt was allowed to activate for approximately two minutes before being mixed with the liquid. After one minute of mixing RevitaDirt with the sludge, this is to ensure complete absorption, a sample was then sent to the lab for analysis. The results are summarized below:

Industrial Sludge Test Results

Constituent	Raw Total Metals	Treated TCLP Metals
Arsenic	2 mg/Kg	ND (Not Detected)
Barium	44.2 mg/Kg	ND
Cadmium	2 mg / Kg	ND
Mercury	ND	ND
Lead	20 mg/Kg	ND
Selenium	2.8 mg/Kg	ND
Silver	ND	ND

Wash Bay Sludge Metal Contamination

Dirt and contaminates that were pressure washed from oil and gas field service vehicles and equipment were collected in a 4'x6'x8' wash bay sump. Contaminants typically consist of oils, greases, metals and chlorinated cleaning solutions. Sediment was removed with a backhoe and placed in a mobile soil mixer. RevitaDirt was activated during mixing and thoroughly mixed. Soil samples were collected before and after treatment to ensure accurate analysis and submitted to a certified laboratory per our tamper proof system.

Constituent	Baseline	Treated	% Reduction
GRO	31,020 ug/Kg	6,130 ug/Kg	80.2%
DRO	7,000 ug/Kg	304 ug/Kg	95.6%
Tetrachloroethene	858 ug/Kg	< 2 ug/Kg	≈100%
Barium*	162 ug/Kg	< 10 mg/L	≈100%
Chromium*	16.3 ug/Kg	< 0.5 mg/L	≈100%
Lead*	16 ug/Kg	<0.5 mg/L	≈100%

* Baseline metals analysis was for Total Metals, whereas Treated samples were analyzed for TCLP Metals

3” Topsoil Lead Remediation – 1 Acre (403.5 Cubic Yards) Cost Comparison

Removal & Replacement Method	
Cost Breakdown Estimate	
Remove / Excavate	$73,840 - $90,384
Clean Topsoil	8,070 - 20,175
Spread & Apply Soil	8,070 – 20,175
Dispose Contaminated Soil	40,350 – 100,875
Total	**$130,330 – 231,609**
Price Per Cubic Yard	**$322 – 574**

RevitaDirt Solution	
Cost Breakdown Estimate	
RevitaDirt Material (12 Tons)	$28,800
Application & Activation	12,000-15,000
Spread & Apply Soil	NA
Dispose Contaminated Soil	NA
Total	**$40,800 – 43,800**
Price Per Cubic Yard	**$101-108**

RevitaDirt Lead Product Ratios

RevitaDirt effectively remediates lead at approximately **60 lbs. per cubic yard** of contaminated soil, at $72 / cubic yard material cost.

1-Ton Bulk Bag of RevitaDirt remediates 33 cubic yards of lead contaminated soil.

Below is an estimated cost of product needed for a 1 Acre site at varying depths of contamination:

Depth	Cubic Yards of Soil	RevitaDirt Needed (In Tons)	Approximate Product Cost
3"	403.5	12	$ 29,052.00
6"	807	24	$ 58,104.00
12"	1614	48	$ 116,208.00
24"	3228	97	$ 232,416.00
36"	4842	145	$ 348,624.00

RevitaDirt is easily applied by loading 1 Ton bulk sacks and tilling into contaminated soil at desired depth. Water is then applied at a minimum ratio of 1:1 with the amount of product used to activate. If soil is wet, or rained, less water is required, however additional water will not reduce effectiveness.

RevitaDirt Oil Contamination Product Ratio

- For every 1 gallon of oil, 4 pounds of un activated RevitaDirt.
- For in-situ application, 55 lbs of hydrated RevitaDirt is recommended per cubic yard of soil.
- RevitaDirt will absorb approximately 80% of oil from soil and sand in the first 2 hours.
- For in-situ application, RevitaDirt is tilled in at contaminated depth, and water is then applied at a minimum of 1:1 water to product ratio (volume, ie gallon to gallon)
  - *(For reference, 1 gallon of RevitaDirt equates to 4.5 lbs. 1 Ton tote is equal to 444 gallons)
- RevitaDirt is packaged in a dehydrated form and expands 3X its original volume when hydrated.
- Shelf life is 5 years if not exposed to weather or direct sunlight.

Let’s Work Together

- RevitaDirt’s mission is to provide cost-effective, environmentally clean & friendly solutions for remediation needs. We aim to effectively recapture the lost value of contaminated land at a competitive cost and superior method.

- For questions and product requests please contact us at:

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