



Energy Industry Hygiene Programs

Overview:

As the past has shown, when the industry is challenged by lower oil prices, it is forced to look for new and innovative ways to do things. Unfortunately, even with lower production still comes inadvertent spills and required cleanups and maintenance. Today, energy companies are learning that quick response and daily management practices can save tremendous amounts of money by re-training current staff to react with easy to use, environmentally safe products and programs which eliminate the issue when it happens at a fraction of the cost. 3 Tier has developed a complete suite of products and programs that can be easily implemented into operations that will significantly reduce overall costs and provide greater protections to the environment without the need for high dollar contractor costs later. The following are a few examples of the available programs.

Tank Farms, Wellheads, Transfer Stations and Refineries:

As production reduces, history has shown that regulators and inspectors have more time to look more in-depth into all operational areas which results in more cleanup and operational maintenance of these working areas. It is normal for valves, points of transfer, and overall site appearance and condition to exhibit stains and minor spills that overtime will become unsightly and create potential environmental cleanup requirements. Regular cleanup and maintenance also increases the life and longevity of the equipment which also saves more towards differed maintenance.

Well Head Maintenance Made Easy: The pictures to the right are an example of what you can do with one person, 65 minutes, and about \$35 of product. This quick demonstration was targeted to clean the valves and area around the valves for better inspection while removing the obvious hydrocarbon buildup with a safe, biodegradable cleaner that has a remedial component to it.

The process was simple, spray the heavy hydrocarbon buildup with Pull It Out, set-up the power washer and use Ultimate 3X Cleaner in the power washer supply tank as well as spray all areas to be cleaned with a quick application and wash. Both products provide aggressive cleaning of all greases, oils, and hydrocarbons, but are safe to all painted surfaces and the environment. For increased cleaning of un-painted concrete surfaces and gravel areas, GreenCat can be applied for more aggressive cleaning.

This process is simple, cost effective, and can be done by any staff member as part of the normal inspection and maintenance process.



Tank Farms, Transfer Stations and Refineries Maintenance: As demonstrated above, cleanup and maintenance of service/sample valves can be done safe, fast, and without complicated processes. Implementing these programs will insure better valve operations and inspection allowing for long term cost savings with increased safety. Loading zones and normal gravel staining is a nature of the process and these products will eliminate them if a regular maintenance process is developed using current staff. For areas with greater hydrocarbon impacts, 3 Tier recommends adding our EPA NCP Schedule 40 listed remediation product, Soil RX, to the treatment program to ensure aggressive consumption of excess hydrocarbon residues that may have built up over time. Again, no special equipment or training is required for the handling and application of any 3 Tier Hygiene Products. All training and support will be provided by 3 Tier Services technical staff or by an authorized distributor of our products.

General Target Areas:

- Valve, pipes, and general service area cleaning and maintenance
- Minor spill/staining management and elimination on concrete, asphalt, gravel, and general parking or storage areas.
- Tank cleaning or de-gassing
- Containment area cleaning and remediation
- Equipment cleaning and maintenance
- General facility maintenance and cleaning

Produced Water Spills:

Emergency Response – Immediate Response: The old adage “Dilution of the pollution is the Solution” will only increase the size and depth of this problem. Pure water, regardless of the quantity will only help in transporting the salts and chlorides to a larger area and will do nothing to correct the problem. The effects of salts and chlorides on soil will occur almost immediately on contact since the sodium and chlorides will react with the soils negative and positive charges and lock into the soil particles rather rapidly. If the same spill was treated with a flush containing 3 Tier’s SA-1000, the ability of the salts and chlorides to attach to the soil would be replaced by bio-polymer contained in SA-1000 which would bind to the contaminants and allow them to safely filter through the profile and limit any plant damage while allowing impacted soils to remain productive after the fact.

- In an Emergency Response setting, the initial goal is to cap/control the flow, contain the area, vacuum or absorb the excess material as soon as possible, then flush the area with SA-1000 remediation solution. Immediate reaction will minimize the impact salts, chlorides, and other potential contaminants in the water, thus reducing the immediate impact to the soils and the environment. This process should also eliminate any need for dig and haul, additional soil processing like scraping or roto-tilling, though roto-tilling the area after the initial treatment with a supplemental treatment may be required for complete treatment of the soils. Within 3 Tiers family of products, we can also provide site restoration and re-vegetation products for rapid re-establishment of any damage related to the spill and cleanup. If the Produced Water had residual hydrocarbons, the initial treatment of SA-1000 can be combined with SOIL RX for a complete remediation solution.
- During normal drilling operations or transfer of produced water to disposal trucks, inadvertent minimal spills occur as a normal course of business. Having immediate response product on site or on the trucks can reduce or eliminate any long term issues and not allow a simple low volume release to build up over time requiring expensive remediation requiring excavation or soil injection because small amounts over time were ignored and have now saturated a work area. Frequent treatment or scheduled work area treatment can be developed to manage normal low

volume releases on site. This also is a valuable process for equipment cleaning locations. Again, if there are residual hydrocarbons in these areas, Soil Rx can be added to the treatment to immediately remediate them so that they will not become a full blown remediation required at the end of the exploration process. In addition, 3 Tier can also provide cost effective, high powered cleaning solutions for these processes that will not only increase cleaning performance, the products will also provide a remedial component to the residues while being completely bio-degradable and safe for the environment and staff. These processes use the same products and philosophies as the cleaning solutions previously mentioned in the section above.

Aged Spill Sites: In our experience, salts and chlorides have shown how quickly they will attach to soil particles especially when clay is present. The result is years and years of unproductive soils that are very visible to landowners and inspectors. To reverse this process and re-establish a healthy soil environment does not require years of time or millions of gallons of precious water to correct. In most cases, corrective action and regeneration of actively growing soils can be achieved in just months.

Recommended Process:

- Proper site delineation is key to successful remediation. Composite or random sampling is sufficient for determining the overall contaminant loading and treatment process. Sampling should be done in 1 to 2 foot depth increments and as specified by local, state, or federal testing regulations. For best results, testing should follow Oklahoma State University soil testing parameters for salts and chlorides. (Contact 3 Tier for specific guidelines)
- Determine the local, state, or federal guidelines required to be met for “No Further Action” letter upon completion or successful testing levels which will be used to establish the required expectations that define a successful completion.
- Determine cubic yards of material to be treated, method of treatment that can be used for the site, time required for a successful completion, rate will be calculated and provided to contractor for completion of the project. Consult a 3 Tier distributor or Technical Support Staff for proper application techniques and rate determination for maximum results.
- Site soil characteristics, time required to complete the remediation, application technique, rainfall and other regional weather characteristics will all influence time and performance of the process. Site restoration can also be completed at the time of the site remediation.
- Experience has shown that many sites can be successfully completed in 60 to 90 days with moderate loading levels while sites with excessive loading may require up to 6 to 12 months to fully complete the process. As with most remediation processes, technique used, rate of product, soil types, and overall time allowed to complete the process will be the determining factor of cost for the project.

General Remediation:

Hydrocarbons: The management and remediation of hydrocarbons can be cost effectively done when a program is designed to manage the loading on a regular basis. Fresh hydrocarbons are easy to fracture and remediate when a program is developed to treat high impact areas with greater frequency and not leave the problem till the loading is such that expensive measures must be deployed to correct.

Most cleaning programs that have established frequency can, in most cases, provide proper cleaning and remediation at the same time. Locations that have excessive build up can be more effectively managed with the application of 3 Tiers heavy lifting hydrocarbon remediation product Soil Rx. Prior to any cleaning processes, any area impacted with aged or higher hydrocarbon buildup can be treated with Soil Rx to manage the increased loading. Once the site is properly cleaned and remediated the first time, ongoing cleaning processes should be able to manage both the cleaning and remediation at the same time. The advantage to frequent programs is significantly lower remediation costs, clean work areas, improved operations of valves, easier site inspection and detection of problem/faulty equipment.

For larger spills or releases, proper response to stop the leak, recover excess material, and immediate treatment response will again provide significant savings with faster remediation and cleanup. Fast treatment response will also increase the safety of the area by fracturing the hydrocarbons and reducing/eliminate the VOC's and other hazardous volatiles that can create a fire or safety hazard.

The key value is that these cost effective processes can be completed by local staff or have a local contractor perform these processes with greater frequency for much lower cost than primary turnarounds or significant remediation processes. 3 Tier offers onsite staff and use training should the client wish to maximize the higher level of cost savings.

H2S: 3 Tier offers several solutions for the management of Hydrogen Sulphide in both oil and wastewater. These cost effective solutions are environmentally safe, bio-degradable, and natural. The key benefit to 3 Tier's treatment products are that once the material is treated, H2S will not regenerate and remain as elemental sulfur. This natural process will not degrade like many chemical treatments which allows H2S to reoccur. Treatments can be done at the exploration site before transport, in pipelines, or at the refinery. Whether it is oil or water, 3 Tier has a treatment program that will correct your H2S issues without any damage or changes to the oil quality or grade and does not have any harmful or corrosive characteristics that can impact pipes, tanks, haulers, or process equipment.

Wastewater - Groundwater: 3 Tier offers a complete program for wastewater/groundwater management. Our team of experts can create effective treatment programs for almost any wastewater/groundwater correction.

Whether you need help meeting local, state, or federal discharge guidelines, have excess organics, hydrocarbons, FOG, sludge, or odor issues, 3 Tier's staff of water experts will consult with your team to develop a program that exceeds your needs using cost effective products that will manage your entire system and not just mask it. We also have specialized processes for effective groundwater treatments for benzenes, chlorinated hydrocarbons and metals to name a few.

Summary:

3 Tier's team of scientists and technical support personnel understand the many challenges that face today's energy industry and are prepared to assist our customers directly or work with your environmental teams or contractors to develop the best, cost effective solution you need. One thing that has been proven through our years of experience, ongoing management and cleaning will result in remediation costs plummeting along with better operational safety. 3 Tier is ready to assist in any way possible, from the simple weekly hygiene programs to the large unexpected inadvertent spills or releases.