ENCLOSED LITERATURE

- LEVEL I thermal remediation systems
- LEVEL II thermal remediation systems
- LEVEL III thermal remediation systems
- LEVEL IIII thermal remediation systems
- Typical Site Configurations
- Indirect Thermal Recovery Systems
- Primary Dust Collectors / Fabric Filters
- Secondary Treatment Units
- Primary Treatment Units
- Material Cooling Units
- Material Preparation
- Gas Stream Cooling
- Facility Controls
- Control Centers
- Custom Retrofits
- Feed Systems
- Stabilization
- Scrubbers
TECHNOLOGY FOR CLEANING AND PROTECTING THE ENVIRONMENT

Astec, Inc. produces innovative infrastructure equipment used around the globe with product lines including; thermal remediation equipment, recycling equipment and renewable energy systems.

By utilizing our extensive resources, Astec has gained a leadership position in this industry and contributes as a major player because of our advanced and experienced engineering research and development.

Experience with material feed, conveyors, screens, dryers, fabric filters and scrubbers gives Astec the advantage in developing various remediation technologies.

Equipment designed especially for remediation includes equipment to process soil, sludge, bio-solids and other various contaminated materials. Air pollution control equipment has been developed as an integral part of these systems.

Contractors with the right equipment can comply with restrictions and even set new standards, while providing alternatives to waste generators for treatment, recycling and the recovering of contaminated materials.

Building equipment is not all we do. We provide permitting assistance and emissions calculations. We train your operators and help you with start-up. In addition, we can also help you develop business plans and marketing strategies.
MATERIAL PREPARATION

To prepare contaminated materials for thermal treatment, they should be blended and screened. Minimizing feed inconsistencies, maximizing production rates.

Soil contaminated with hydrocarbons usually contains areas where contamination is greater than in others. Uniformity is essential for processing soil at a constant rate and to ensure conformance to specified cleanup levels. Blending mixes all ingredients uniformly and also evens out soil moisture. Blending is achieved by excavating soil from a relatively large area and mixing it before loading into a feeder bin. Blending can also be accomplished by using a two-bin feed system.

Contaminated soil often contains large rocks, metal refuse, clay lumps and other debris. Most debris is removed by a bar grizzly as the soil is loaded into a feeder bin. The soil goes from the bin through a clay shredder. It is then fed through a scalping screen, which catches and removes any remaining debris. After adequate pre-screening, blending and material preparation, the soil should have uniform moisture and hydrocarbon content and be free of debris. This ensures that thermal treatment will be thorough and efficient. An inclined conveyor then feeds and meters the material to the Primary Treatment Unit (PTU).

THERMAL TREATMENT

The PTU heats contaminated material to evaporate hydrocarbon contaminants and water. This process is known as low temperature thermal desorption (LTTD). It is a controlled evaporation process.

Typically, contaminated materials are treated at temperatures of 650°F to 900°F (340°C - 480°C) then discharged from the PTU. The heat removes compounds by changing them from liquid to vapor. The vapor becomes part of the exhaust gas stream controlled by the draft system. The PTU can be direct-fired or indirect-fired, depending upon the design of the system.

The operator controls the rotating speed of the PTU so the retention time of the material is optimized achieving the highest efficiency for specific material conditions.

The treated soil exits the PTU and is discharged into a cooling unit, which is either a pugmill mixer, auger or wet ash drag where water is added for cooling and dust control. The treated and cooled material then exits the cooling unit and is discharged by a conveying system as a remediated material, ready for testing, subsequent re-use and recycling.
EXHAUST GAS TREATMENT

The gas stream from the PTU requires further treatment before it is released into the atmosphere. First, it typically goes into a primary dust collector. The dust collector removes larger particles from the gas stream, minimizing buildup of material in downstream components, especially the STU (Secondary Treatment Unit).

With direct-fired thermal systems, the Secondary Treatment Unit (STU) oxidizes hydrocarbon contaminants from the gas stream by heating to temperatures above those required for auto-ignition. Typically, treatment temperatures range from 1,400°F to 2,000°F (760°C to 1,090°C), depending upon the type of contaminant. Most hydrocarbon contaminants are converted into carbon dioxide and water by high temperature oxidation. The hydrocarbon contaminants released in the remediation process are eliminated by conversion to inert compounds.

With indirect-fired thermal systems, the PTU exit gases are routed through scrubbing and condensing systems where all condensibles are collected then separated to produce a recovered product. These systems are usually applied to highly contaminated materials where recovery of the contaminants is the remediation goal.

After leaving the STU, the gas stream is usually cooled in a gas cooling unit to a temperature suitable for a fabric filter, usually about 450°F (230°C). The gas stream then passes through the fabric filter where remaining particulate is removed. The gases are then exhausted into the atmosphere, or treated further in a scrubber if chlorinated or sulfonated constituents are involved.

THERMALLY TREATED SOILS

Thermally treated soils are free of hydrocarbon contaminants, inert and ready for re-use. In many cases, they have proven to be an excellent construction material because the oversized material and debris have been removed.

Astec thermal systems can be designed to control the moisture content of the final recycled soil product and add stabilizing and/or nutrient enrichment ingredients, depending on the intended use for the final product. The remediated soil can be used for; fill material, landfill cover, road base, top soil, berm construction, or for many other applications involving clean, treated soils.
PETROLEUM HYDROCARBONS

Astec Thermal Remediation Systems treat soils and sediments containing various hydrocarbons ranging from gasoline and jet fuels to lubricants and heavy oils. Usually, heavier hydrocarbon contaminants require higher temperatures for treatment. Petroleum hydrocarbon contaminants are typically found at gasoline stations, fuel tank farms and depots, railroad maintenance yards, airports, and fuel spill sites resulting from transportation accidents. These types of remediation projects have been done by using both “on-site” and “off-site” approaches. Astec systems can be set-up at a central location, where contaminated materials are brought in from various locations.

OILFIELD WASTES

Astec Indirect Thermal Recovery plants have effectively removed, recovered and recycled hydrocarbon contaminants. Oilfield wastes typically include tank bottoms, drill cuttings and oilfield sludges. High concentrations of petroleum products are typically contained in these wastes. Recovery of these contaminants can produce a recovered product which can have significant value in recycling. To recover these petroleum products, the Astec Indirect-fired thermal desorption processes can be used to separate a wide range of hydrocarbon type contaminants from soil, sludge and/or sediment, while condensing and recovering the contaminants. The air pollution control systems for these applications include scrubbers and condensers which are specifically designed for the type and concentration of the particular contaminated media to be treated. The arrangement of the components within these systems can vary depending upon the project parameters and feed material constituents.

COAL GASIFICATION SITES

Astec direct-fired thermal desorption plants have effectively treated materials from many different manufactured gas plant (MGP) sites. Also known as TOWN GAS WORKS, these plants used a coal gasification process to manufacture fuel gas for lighting and heating. The by-product produced was a gas-processing residue. Many of these facilities generated large volumes of waste oil residues commonly referred to as COAL TARS which were buried in waste pits on-site and remained after the plants closed. Chemically, they primarily consist of polycyclic aromatic hydrocarbons (PAH’s). These high-boiling point contaminants are effectively treated by using the Astec parallel flow rotary drum. The Astec parallel flow system has the inherent ability of achieving the best treatment standards for the fine materials which become airborne in the drum. This is possible because of higher temperature gas stream in a parallel flow PTU. Similar site contaminants that have been effectively treated by Astec plants include creosote and wood treating compounds from industrial processes which used coal, creosote and #6 fuel oil, or bunker fuel.
PESTICIDES

Pesticides are toxic compounds used for insect control which are very stable and under normal conditions will remain in the environment for years. Pesticide contamination is typically found where pesticides were manufactured, stored and/or applied. In general, pesticide contaminants have low vapor pressures and relatively low boiling/decomposition temperatures. These characteristics make these compounds well suited for thermal treatment to effectively remove them from soils. However, many of the contaminants contain chlorine, known as organo-chlorine pesticides. When chlorine is present, the destruction of these compounds will produce HCl as the compounds undergo thermal decomposition. An appropriate thermal treatment system therefore needs a means of controlling these acid gases. One such method involves the addition of a scrubber at the end of the process to control emissions of these acid gases. Thermal Desorption Systems with acid gas scrubbers have proven very effective. As a result, large volumes of pesticide contaminated soils have been treated in Astec Thermal Treatment Systems.

MUNICIPAL BIO-SOLIDS

Other forms of recycling are being combined with the Astec Soil Remediation Process, including the treatment of municipal sludges, known as BIO-SOLIDS. The system shown at right utilizes a patented approach whereby sludge filter cake from the municipal wastewater treatment facility is introduced into the material cooling unit of a soil processing system. Here, it is heated to a predetermined temperature so that its pathogens are destroyed, but beneficial nutrients are maintained. After thorough mixing and pasteurization in the material cooling unit, the final soil-sludge product is discharged. The enriched product has enhanced material qualities and has been used for topsoil and potting soil.

INDUSTRIAL SITE REDEVELOPMENTS

There are many closed industrial sites throughout the world that are being dismantled, remediated and redeveloped. In many cases, the properties have been sitting idle for years while the economic conditions evolve to the point that the value of the property in a redeveloped state outweighs the costs of the redevelopment. It is becoming common for these former industrial sites to be redeveloped for other uses outside of industry, including residential use and parkland. In many cases, regulatory issues also become a significant driver for redevelopment. Contaminants at these sites will vary widely depending on its former use and can include variations of hydrocarbon fuels, lubricants, solvents, chlorinated compounds, pesticides, agricultural contaminants, etc. Large quantities of contaminated materials at these industrial sites have been treated by Astec Thermal Remediation Plants. Many other sites are anticipated in the future.
CUTTING COSTS
Astec brand portable plants and portable, or modular components have many features to reduce costs for moving them from one site to another and to greatly reduce field work. These features keep your relocation time and labor expenses to an absolute minimum. An entire plant can be dismantled, moved and set up at another location in as little as 72 hours.

TROUBLESHOOTING
Astec qualified service technicians are available to assist you with your plant. In addition to helping with the initial start-up of the equipment, they are also available to address questions concerning operations, troubleshooting, and replacing parts during the entire lifetime of your Astec equipment.

TRAINING
Astec personnel assist you with the start-up of your new thermal remediation system facility. We teach operators how to properly operate and maintain your plant for long-lasting, optimum performance. Astec hands-on training can be at your plant or within our state-of-the-art training center at our manufacturing site in Chattanooga, Tennessee, USA. Optional levels of training are available from the basic operating techniques to more theoretical and advanced topics.

ENGINEERING
Astec engineers are available to assist you with equipment changes, additions, stack test plans, process changes and job-specific operating parameters. Our engineers and service technicians can work with your operators and troubleshoot solutions. We also offer professional assistance for job bidding and site planning to help determine the most efficient operating conditions for your applications.
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ASTEC

Thermal Remediation Systems

Recovery, Remediation and Recycling Product Lines

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