The Environmental Corner

How The Cost Of Cleanup Can Be Controlled By Things You Cannot Control

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Land Use And Geology As Hidden Variables

I am often asked by drycleaners how we will do the clean up and what will be the costs? It is almost always impossible to say at the onset because almost every situation is unique with a number of variables.

Environmental contamination from dry cleaning facilities is observed commonly. Historical spills and releases, from outdated machinery and outdated hazardous material handling practices are examples of the causes that may have impacted the soil and groundwater below such facilities.

Unfortunately, the amount of material released into the subsurface and the time duration during which it was released are not the sole indicators of the resources required to remediate the impacted media. The cost of cleanup is determined by a complicated combination of variables. For instance, if a gallon of Perc is spilled at Site A and at Site B, the cost of cleanup may be vastly greater at Site B based on the type of geology below the ground and/or the type of current use of the land at the surface.

As consultants, we are always doing our best to keep up with the newest and greatest remedial technologies that our industry has developed. However, it is imperative that we as professionals match up these innovative (as well as the proven) technologies to a geologic setting that allows it to be successful. We also need to consider the land use at the surface. For instance, the land could be used as a drycleaner for years to come, or it could be used for residential housing in the future. The intended current and future land use of the property has an important effect on the amount of cleanup that will be needed to reach cleanup objectives.

When it is known that a site is impacted, the consultant needs to be in communication with the property owner/tenant to determine what the goal for the property is. If the property requires a cleanup to residential (as opposed to commercial/industrial) standards, it will require more resources to complete the work. Environmental impact can also spread

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to adjacent properties that may need to be remediated to a certain goal based on the individual land uses for each property. At drycleaner sites with contaminant plumes that migrate onto other properties, the determination of cleanup goals can be costly to complete even before environmental cleanup begins.

When a goal for cleanup is known, which typically is constructed concurrently with the subsurface site characterization (soil, groundwater, and soil gas and indoor vapor sampling), a conceptual site model can be created for the cleanup of the site. The conceptual site model, which is often accompanied with a 2-dimensional graphic, presents an overview of the site stratigraphy and geology, the points where releases are likely to have occurred and the migration of the contaminants through the soil into the groundwater and indoor air. These conditions consist of knowing what type of soil makes up the stratigraphy and how that type of soil effects the migration of released contaminants, how deep is groundwater encountered, and what the groundwater flow characteristics are (flow direction and velocity), and what types of exposures exist (human health as well as environmental exposures). A dynamic understanding of the soil and groundwater conditions is imperative to any preparation to complete remedial activities.

If soil and/or groundwater are impacted, the depth to the impacted media has a large effect on the closure cost as remedial activities must be implemented from the ground surface. The type of soil can also have a major influence on what the final cost will be. The goal of successful remediation is to create direct or indirect contact with the contaminants with the remediation technology; utilizing, for instance, a direct chemical reaction or through applied vacuum. Clay soils do not readily allow groundwater or air movement making remediation more challenging for sites with these conditions. Sandy soils will allow more options and therefore the potential for a more cost effective remedy when compared with the clay type soils.

It is not uncommon for sites to have mixed soil types such as layers of alternating sand and clay with varying thicknesses. In these situations, groundwater and air flow through the system can be complex which creates a potentially more expensive remediation project. It is important for the geology and hydrogeology to be well understood prior to implementing any remedial plan. Many times, a pilot test is required to test potentially viable technologies on a smaller scale than a full remediation.

The surface conditions can limit the types of remediation technologies that are possible to implement. If a drycleaner is surrounded by buildings in close proximity, many types of remediation that require more surface space to complete will not be possible. Drycleaners are often found in strip malls. This potentially presents a challenge for subsurface access as well.

For a drycleaner that has operated on a property for many years the land use 30 years down the road may not have even been considered. These variables; however, have a profound effect on the cost of any cleanup that may be required.

In closing, many variables effect the selection of remedial technology and ultimately the cleanup cost. As discussed, the site stratigraphy/geology/hydrogeology and the current and future land use affect the cost of cleanup. Other potential factors include whether groundwater is impacted in multiple units/depths, whether or not neighboring commercial and/or residential structures have vapor intrusion issues, whether the utility corridors serve as a preferential contaminant migration pathway, whether or not drinking water wells have or could be impacted, and whether there is easy access to physically remove contaminated mass (hot spot excavation verses alternative mass removal approaches).

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