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## **Section 5.0 Other Technology Requirements**

### **5.1 Environmental Regulation Requirements**

State and local regulatory agencies may require permits prior to implementing an in-situ biodegradation technology. Most federal permits will be issued by the authorized state agency. An air permit issued by the state Air Quality Control Region may be required if it is anticipated that the air emissions from potential surface venting are in excess of regulatory criteria, or of toxic concern. Wastewater discharge permits may be required if any wastewater generated from well purging and decontamination activities were to be discharged to a POTW. If remediation is conducted at a Superfund site, federal agencies, primarily the U.S. EPA, will provide regulatory oversight. If off-site disposal of contaminated waste (contaminated drill cuttings) is required, the waste must be taken to the disposal facility by a licensed transporter.

Section 2 of this report discusses the environmental regulations that may apply to the Enhanced In-Situ Bioremediation process.

### **5.2 Personnel Issues**

The number of personnel required to install the Enhanced In-Situ Bioremediation technology should depend on the size of the treatment system and the time desired for the installation. Drilling and well installation labor activities are performed by a drilling contractor. Normally, there are a minimum of two contractor personnel assigned to a drill rig (head driller and helper). There may be a third contractor representative who conducts well completion and development following well installation. The remediation contractor at a site (such as Earth Tech) would be responsible for logging boreholes, monitoring for VOCs and explosive conditions, and ensuring that well construction and installation is conducted in accordance with design

specifications. These activities would require the services of at least one individual (preferably a geologist).

The site contractor would need one to two individuals to procure the injection system parts, the associated monitoring equipment, and initial first year enhancement supplies (e.g., methane, TEP, etc.); arranging for and overseeing the electric utility hookup; installing the injection system components and associated monitoring equipment (e.g., dedicated bladder pumps for the wells), and conducting preliminary air and helium injection tests to determine fracture patterns and zone(s) of influence. Estimated labor requirements for a full-scale treatment system are discussed in detail in Section 3 of this report.

Personnel are also required for sample collection and groundwater monitoring. During the demonstration sampling events, two to three SITE team members were required to conduct field measurements and sample preparation. Personnel present during sample collection activities at a hazardous waste site must have current OSHA health and safety certification.

For most sites, PPE for workers will include steel-toed shoes or boots, safety glasses, hard hats during drilling operations, and chemical resistant gloves. Depending on contaminant types, additional PPE (such as respirators) may be required. For example, respiratory protective equipment may be needed in instances when VOCs are measured in the breathing zone (i.e., above the well head) exceeding predetermined levels.

Noise levels would be a short-term concern during drilling operations and may be of concern during injection phases (i.e., a loud compressor for larger systems could create appreciable noise). Thus, noise levels should be monitored for such equipment to ensure that workers are not exposed to noise levels above the time weighted average of 85

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decibels over an 8-hour day. If this level is exceeded and cannot be reduced, workers would be required to wear hearing protection and a hearing conservation program would need to be implemented.

### **5.3 Community Acceptance**

The short-term risk to the community is minimal since the compressed gases are secured in a building or shed and the treatment occurs in-situ (i.e., underground). As with any gas that has flammable characteristics there is a potential

to create an explosive environment, therefore methane is closely monitored to ensure that the injection concentration does not exceed 4 % by volume, thus avoiding the lower explosive limit of 5 %. The level of environmental disturbances would be dependent on the number of wells required and the locations of those wells. Other than noise generated during drilling to install monitoring wells, noise would only occur during operations requiring an air compressor (i.e., periods of gaseous phase injection and sample collection if bladder pumps are used).