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### **Be Safe When Sampling Water and Soil!**

As surface mine reclamation inspectors, you are frequently asked to sample mine seeps that have the potential to have sewage in them. You are also frequently asked to investigate complaints from citizens concerning the potential contamination of drinking water by mining operations. Most rural homes in the coalfields obtain their water for drinking and domestic use from a hand dug or drilled well. State and federal government requires public water systems to provide biologically safe water. However, the safety of a privately owned, individual water supply such as a backyard well rests in the hands of its owner. While taking the water and soil samples necessary to conduct a full investigation of a complaint against a mining operation, you can be exposed to potentially harmful viruses, bacteria, protozoa, nematodes and other microorganisms. The microorganisms can come from various sources including sewage, animal wastes, or dead and decaying animals. Short-term gastrointestinal disorders and serious illnesses such as gastroenteritis, giardiasis, typhoid, dysentery, polio, cholera, and hepatitis have all been linked to water contaminated by microorganisms.

Viruses in sewage wastewater are one example of pathogens to which you can be exposed. Viruses can travel horizontally or vertically through soil. The rate of virus movement is influenced by the presence of water in the ground. To monitor the horizontal movement of the two viruses through soil that is saturated with groundwater, water samples have been taken from wells located 3 to 46 meters from contaminated sources and then analyzed for virus presence. In soil that was not saturated with water, viruses may only travel 1 meter per day. However, in

those areas where groundwater saturates the soil, viruses can travel up to 15 meters per day. Poliovirus for example, has been isolated from a 30.5 meter deep well contaminated by a septic tank leach field. The virus had to pass through thick layers of clay, shale, and limestone to reach the well water.

Disease-causing bacteria like *Escherichia*, *Salmonella*, *Clostridium perfringens*, and *Shigella* can also be transported by groundwater. Like viruses, bacteria in water cannot be seen, tasted, or smelled, and many health-related symptoms are not immediate. A laboratory test is the only way to reliably determine if drinking water is contaminated. *Coliform* bacteria like *E. coli*, are always present in the digestive systems of humans and animals and can be found in their wastes. Most of these bacteria do not cause disease. But their presence in drinking water is an indication of human or animal waste contamination that, in turn, can indicate that disease-causing bacteria may be present. The Federal goal for public drinking water is 0 colonies of *coliform* bacteria per 100-milliliter (0.1-quart) sample of water.

To be effective, a septic tank system must be properly installed in soils with adequate drainage. When the settling tank becomes full, it should be pumped out. Furthermore, septic tanks should not be placed too close to well sites since the movement of potential disease causing microorganisms through the soil could contaminate the drinking water. So common sources of *Coliform* bacteria and disease-causing microorganism are failing septic systems and failure to isolate wells from potential animal and human contamination.

You should exercise the following common sense precautions when taking and handling water and soil samples: (1) Always wear disposable latex gloves to avoid accidentally transferring potential pathogens from your hands to your mouth. (2) Carry bottled water for personal use rather than drinking water from a source that could be contaminated. (3) Consider

being vaccinated for hepatitis A, hepatitis B, and tetanus since there is always a potential that you can be exposed to these diseases. By exercising precaution and common sense, you can be safe when sampling water and soil as you conduct your duties as a surface mine reclamation inspector.

**Safety Tip: When sampling soil and water take all the necessary safety and health precautions so that you perform the job safely.**

**This will protect your health and safety.**

