

Part 5: Tips for Using the Air Lance and Vacuum

When practical do not use the standard air lance to dig the first 12" of depth. Not only is this dangerous to the operator and passers by, but the first 12" of soil can be very hard and compact. It is better to select a digging bar or other appropriate tool such as a "clay point" lance to break up the hard top layer, and use the vacuum to remove the broken soil. It is a good idea to know the approximate depth of the target utility. If you suspect the utility is less than 2 feet deep you may have no choice but to begin your excavation with the air lance so as to not damage the utility.

Never push the standard air lance into the soil without the air turned on. This will clog the tip. A handy tool for unclogging the tip is a piece of hacksaw blade (Figure 20) with the teeth ground off. Make sure there is no pressure behind the lance before you try this. Disconnect the air lance from the air supply to be sure. Make sure that all connections in the lance are very clean. This will keep the connections from leaking.

In very hard soil, add about a gallon of water to the test hole after it is about a foot deep. Then use the lance to drill a pattern of pilot holes and allow the water to combine with the cuttings in the hole to form a slurry. Once you have drilled five or six pilot holes this way, you should be able to break up the hard pan and continue on down to the utility. If you are working in difficult soils contact the factory, there are several different types of air lances available to handle problem soils such as hard pan or tight clay.

In frozen soil, use the pilot hole method to break up the frozen soil. Gently "dance" the lance over the frozen soil. Do not force the lance or drive the lance into the soil; let the air do the work.

For valve box cleaning, start by using the air lance to loosen the dirt; then apply vacuum and air lance at the same time to complete the process. You may find that a 3" pickup hose works better.

In very sticky mud and clay use the vacuum alone to pull up "plugs" by taking advantage of its high vacuum capabilities. Push the vacuum pickup pipe into the soil then pull it out and allow the plug of soil in the tube to be pulled through. Caution, when the plug comes through the pipe, it will be moving fast. This can be a very effective technique. Some types of clay soils can be excavated using a "clay point" style air lance. Call the factory to discuss which lance is best for your soils.

In very unstable soils, you may need a casing pipe for the spot hole to prevent cave-ins. A section of 6" or 8" plastic pipe works well for this. Before using a casing pipe, it is best to pre-locate the utility with your air lance to make sure you don't waste any effort. It may not be possible to remove your casing pipe from the hole.

Attempting to empty the hopper by tipping it forward is not recommended. A full hopper can weigh in excess of 900 pounds! Open the lower door and remove vacuumed material with a shovel, as shown in this photo. Once the hopper has been shoveled out, the hopper can be tilted forward to completely empty it.



Fig. 20

Figure 20: A hacksaw blade with the teeth removed is a good tool for clearing a clogged nozzle. Relieve all air pressure in the lance before doing this.

Part 6: Locating Utilities

Setting up the Jobsite

Before you start the utility location work, you should get to know your jobsite. Is the job in a city setting? What traffic control devices will you need? Will you need to close a lane? Do you need to obtain a state or local permit? Is the jobsite "off-road" easement work, or limited access highway? Knowing the answers to these questions ahead of time may save you a headache later. Knowing your jobsite needs early will help save you time in setup and help provide a safe work area for you and your crews. Be sure to notify the local utilities to mark their lines in advance of your work.

(Figure 21)

Setting up the Test Hole (Spot Hole)

The Utilivac® system can excavate very rapidly. The operator must resist the temptation to dig blindly until the target utility is uncovered. Pinpoint the location of the target utility to insure that you are not wasting time by digging in the wrong spot. Utiliscope recommends using and sells electronic utility locating equipment. Remember: the smaller the spot hole, the faster it can be dug and filled in. Because the Utilivac® is capable of digging to depths of over twenty feet, a one foot horizontal error may result in hours of time wasted. (Figure 22)



Fig. 21



Fig. 22

Setting up the Equipment

Once you have determined the exact point to dig, bring your truck and compressor into the work area. If you will be working in a travel lane, we recommend placing your truck between you and oncoming traffic. Remember, when working around a vehicle, make sure the wheels are always chocked. Next, bring out the hopper and set it at the opposite side of the hole away from the truck, about 3-6 feet from the hole works well. By placing the hopper there you will not have to walk around it if you need to go back to the truck for equipment and may prove helpful when working in traffic or close quarters. Next bring out your vacuum generator. Set the generator on the hopper making sure the compressed air connection on the generator faces the same direction as the pickup hose. This will point the exhaust away from you. Attach the pickup hose to the material inlet. Note: REMEMBER TO USE SAFETY PINS IN ALL OF THE AIR FITTINGS. Next connect the hand operated valve assembly to the vacuum generator HAND TIGHT ONLY. Now, connect the air supply hose from your compressor to the other Chicago fitting on the hand operated valve assembly. Connect a separate air supply line to the air lance if desired. If cutting asphalt or concrete is required, you will need a paving breaker and bits. Also, don't forget the asphalt or concrete patch.

Starting the Spot Hole

Although it is not necessary, you may want to start the test hole with a shovel, digging bar or other hand tool. This will reduce the amount of blowing dust and dirt once the air lance is inserted. If working around fiber optic cables, gas lines or PVC piping, extreme care must be taken when using hand tools. Keep the opening in the ground as small as possible. We recommend an initial cut of 8"x 8". After the hole has been started, use the air lance to pinpoint the utility by "pre-locating". "Pre-locating" means using the air lance to "bore" a hole through the soil until you can feel the utility on the tip of the lance. Excessive downward force is not necessary. A steady "twisting" or 90 to 180 degree rotation is normally all that is needed. By "pre-locating" the utility in this manner you can save countless hours of digging, and will let you know right away how deep the line is. Even though you may feel the utility through the pilot hole, it is imperative that you visually verify. As the soil becomes aerated and breaks up, use the vacuum to remove the loose soil. When you reach the top of the utility, start working on the soil to the side of the pipe. It is a good practice to expose the top (crown) and the side (spring line) of the utility. This will help give you a clearer picture of the utility. Size, material and condition are more easily obtained in this manner. **(Figure 23)**



Recording the Data

If there are specific details about the utility that need to be recorded, we recommend you create a standard form to write them on. Recording the data should be done while the hole is open. If you are digging several holes a day, recalling the details of one from another is tough. Some of the things you may want to write down are: size, depth, material, color, condition of utility, soil condition (type of fill, wet or dry), trend of utility, fittings, joints or bends if found. A typical data sheet is illustrated in Appendix 1. Appendix II shows a data sheet with information recorded. **(Figure 24)**



Backfill and Site Restoration

Proper backfilling of the test hole is very important. If the hole is not backfilled

properly the utility may be damaged. Insure that select backfill goes in the hole first. The Ultivac® tends to keep the soils stratified in the hopper, so the last soil removed from the hole (from around the utility), will be on the top layer in the hopper. Dumping the hopper away from the hole will allow you to shovel or sweep the select material back into the hole first. When working under pavement, backfill only 12" - 18" at a time then tamp thoroughly. If it is available to you, we recommend using a pneumatic tamper (Figure 26). This will insure that your test hole will not cave in and cause a pothole. A pneumatic tamper will also help tamp the asphalt patch. If you use cold patch asphalt, make sure the area is dust free to insure a good patch. Broom the border of the pavement cut before applying the cold patch. Dusting the patch after it is done with road dust will help prevent it from sticking to tires and shoes. **(Figure 25)**



Tear Down and Clean Up

Equipment tear down is basically opposite of the setup procedure. Just remember to shut off the air supply at the compressor first and then relieve the pressure from the hoses. Squeeze the trigger on the air lance and open the hand operated valve (or foot operated valve) on the vacuum generator. This will drain the lines. When all the air hoses are completely unpressurized, it will be safe to remove the safety clips and disconnect hoses. Inspect the vacuum generator. Remove any debris that has accumulated inside the vacuum chambers.