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UET's Single Phase Extraction of LNAPL

Single Phase Extraction (SPE) of LNAPL without the liability and cost of dealing with the treatment and disposal/discharge of groundwater is now possible with the advent of UET's ProVac Systems. The same high vacuum capability of Dual Phase Extraction Systems is available with the UET SPE ProVac System, but with addition of its selective product-only pumping that substantially reduces both capital cost and operating costs. UET's SPE ProVac System can be installed for 1/3 to 1/2 the capital cost of a comparable DPE system. Not having to pump, treat and discharge groundwater will greatly reduce the operating cost of product recovery operations when the UET SPE ProVac System.

UETs ProVac Systems are available in 3 basic configurations:

- **MINI ProVac**

  - ✓ Pumps product in 2" diameter wells;
  - ✓ Portable Self- Contained System – Can be moved from one well to another;
  - ✓ Remote monitoring of system operation is available;
  - ✓ Control System will provide product recovery data for making informed site evaluation descisions.

- **Standard ProVac**

  - ✓ Pumps product in 4" diameter wells;
  - ✓ Portable Self- Contained System also available, or fixed installation;
  - ✓ Remote monitoring of system operation is available;
  - ✓ Control System will provide product recovery data for making informed site evaluation descisions.

- **Multi-Well ProVac**

  - ✓ Multi-well configuration can be installed in both 2" and 4" wells;
  - ✓ No limited to number of wells employed;
  - ✓ Remote monitoring of system operation is available;
  - ✓ Control System will provide product recovery data.

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How does it Work?

The basic components of the SPE ProVac System are a compressor, a vacuum pump with tank, a PLC control system and down well units for each well.

A vacuum is applied to the Down Well Unit (DWU), which will cause the liquid in the well to rise to the DWU product chamber intake. Sensors will determine if the liquid is product or groundwater. If the liquid is water, the vacuum is removed so that water does not enter the DWU product chamber.

If it is product, the liquid is allowed to fill the DWU product chamber and it will continue to fill until the product level in the DWU product chamber reaches an upper level sensor. At this point, the vacuum is replaced by pressure and the product in the DWU will be pumped to a redundant Oil/Water Separator and then on to a product recovery tank. When the DWU product chamber is emptied, a low level sensor will signal the control system to turn off the pressure and apply the vacuum once again.

If the liquid is groundwater, the vacuum is removed and will not return until an adjustable timer in the control system times out.

How do you install?

The DWU can be properly positioned by observing indicators on the ProVac Test Unit (PTU). As the DWU is lowered into the well, an indicator will signify when the unit reaches the product in the well. At that point the DWU can be raise an amount appropriate for the installation, (0 to 8 inches) which will depend on the as-built well specifications and the formation's hydrogeologic parameters all of which affect the vacuum caused up conning.

If the liquid in the well is water (no product), an indicator will signify this condition.

In addition, the DWU can be used to measure the amount of product in the well by observing the indicators as the unit is lowered in the well until the groundwater is detected

How do you use the ProVac?

Figure 1 shows a typical installation of SPE ProVac System. A vacuum system (3) will commence applying a vacuum to the Down Well Unit (8) which in turn will exert forces on the liquid in the well and surrounding the well (9), causing an up conning of the

product plume (10). This upconning will continue until the DWU (8) is completely filled with product. When the PLC Control System (4) is signaled that the DWU (8) full, the compressor system (1) will provide pressure to pump out the product from a Down Well Unit (8) to a Product Recovery Tank (7), after it passes through a redundant Oil Water Separator (6).

Sensors in the DWU (8) will signal the PLC Control System (4) via a Well Interface Unit (5A). These sensor signals will indicate when groundwater is present at the DWU (8) intake, when the DWU is full and it is empty, and other operational data.

A multiwell ProVac is simply a regular Provac with additional wells.

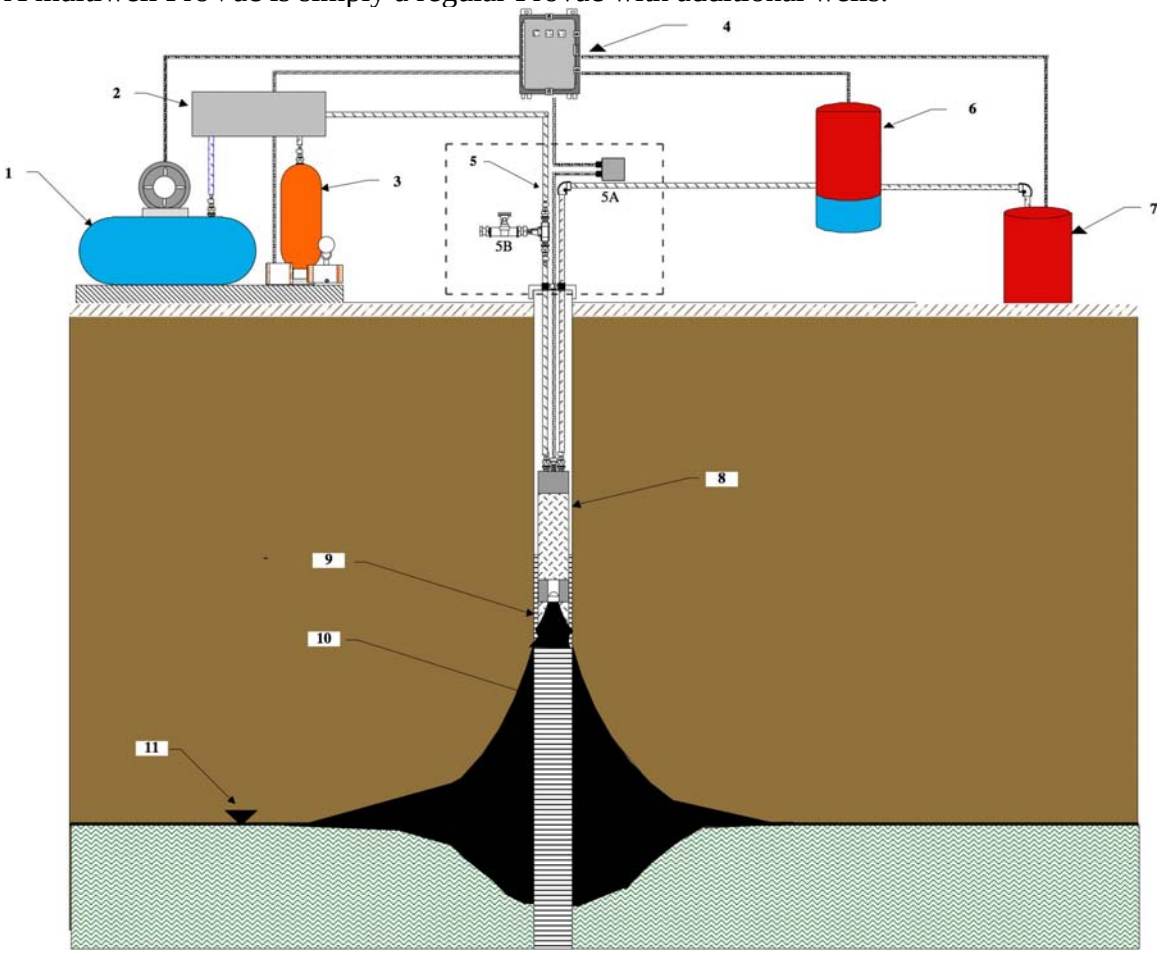

FIGURE 1 PROFILE OF REGULAR PROVAC INSTALLATION