BPSS-12F-Ground Water Recovery System Pumping Test Guidance

This document provides general guidelines for conducting a groundwater pumping test for the purpose of designing groundwater recovery systems. A groundwater pumping test is required to evaluate the feasibility of a groundwater recovery system and to determine the aquifer characteristics in the area of contamination, unless the aquifer characteristics from a nearby site with a similar recovery well design and lithology are available.

The following are general guidelines for implementing the pumping test:

1. The following, at a minimum, shall be considered during the pumping test recovery well (RW) design:

    a. A specific capacity test shall be considered prior to commencing the pumping test to determine the maximum yield of the RW.

    b. The RW shall be located, in general, within the most contaminated area (i.e., highest concentration of COCs) of the plume, or as close as is physically possible, and the recovery well screened interval positioned considering the following:

        i. Current groundwater depth and history of seasonal fluctuation;

        ii. For conducting the pilot test, consideration should be given to installation of a new recovery well of a larger diameter anticipated to be used for full scale operation rather than to use an existing monitoring well of a smaller diameter;

        iii. Groundwater contaminant plume distribution (horizontal and vertical) and COC concentration history;

        iv. Physical and chemical properties of the COCs (e.g., retardation factor, etc.);

        v. Aquifer hydraulic conductivity and its variation with depth;

        vi. Anticipated radii of influence, accounting for the accuracy of the plume delineation, and a recommended terminus groundwater drawdown of 0.1 feet;

        vii. The need for multiple RWs and multiple screen depths to add flexibility to the system, considering factors such as the size of the plume and vertical flow;

        viii. Location of drainage systems;

ix. The recovery wells should be located to maximize the influent concentration (i.e., within the most contaminated area of the plume);

x. Stagnation areas. Stagnation areas may be addressed by varying the flow rate, recharge gallery location or on/off operation; and

xi. Treatment system recharge areas (e.g., infiltration gallery, recharge well, etc.) and their impact on the recovery system and contaminant migration.

c. The pump used for the pumping test shall be capable of an extraction flow rate that is adequate to stress the aquifer;

d. A grout seal, sampling port, flow meter, check valve, and throttling valve are required; and

e. The pumping test RW should be utilized, if feasible, in the final design.

2. The following, at a minimum, shall be considered during the observation well design:

a. The number of observation wells shall be sufficient to properly evaluate the operational conditions;

b. The screen interval of the observation well shall be similar to the screen interval of the RWs and shall be based upon the expected horizontal and vertical area of influence of the RW (considering factors such as flow rate and aquifer transmissivity). Nested observation wells with different screen intervals may be necessary to evaluate all impacted strata of the aquifer or the influence of multiple extraction locations and depths (i.e., RWs);

c. Observation wells shall be located in a radial pattern, to evaluate the influence of the RW in all directions, and shall be located at appropriate distances from the RW (e.g., 5 ft., 15 ft., 30 ft, 50 ft., etc.); and

d. The observation wells shall be appropriately located to evaluate

1) any anisotropic conditions (e.g., backfill, tank farms, drainage structures, etc.), and
2) areas of potential preferential pathways (e.g., utilities, etc.).

3. Groundwater elevation measurements shall be taken from the RW, observation wells and, if necessary, a background well (located beyond the predicted influence of the pump test to correct for outside influences such as tidal canals and levees). These measurements should be taken under both static conditions (i.e., prior to the test) and dynamic conditions (i.e., throughout the test). When taking measurements under

dynamic conditions, the following frequency is recommended (see "Analysis and Evaluation of Pumping Test Data" Second Edition, 1990, by G. P. Kruseman and N. A. de Ridder):

	TIME	FREQUENCY
:	0-2 min.	10 sec.
	2-5 min.	30 sec.
	5-15 min.	1 min.
	15-50 min.	5 min.
	50-100 min.	10 min.
	100 min. - 5 hr.	30 min.
	5-48 hr.	60 min.

4. Flow rate measurements shall be taken throughout the test.

5. Dynamic samples shall be collected, at a minimum, at the midpoint and end of the pump test and shall be analyzed for all COCs to evaluate the effectiveness of the recovery system and to aid in the design of the treatment system. In addition, the sample collected at the end of the pumping test shall be analyzed for background data (e.g, iron, total organic carbon, total hardness, suspended solids, etc.).