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NEW MEXICO ENVIRONMENT DEPARTMENT
Hazardous and Radioactive Materials Bureau

MEMORANDUM

DATE: May 3, 1996
TO: Ron Kern, Technical Compliance Program Manager, NMED-HRMB
cc: Philips Semi-Conductor File
Stephanie Kruse, RCRA Permits, NMED-HRMB

FROM: Dale E. Conover, Technical Compliance Program, NMED-HRMB Dale E. Conover

RE: PHILIPS SEMICONDUCTORS / CITY OF ALBUQUERQUE PROPOSED LOW-FLOW PUMP&MONITOR WELL SCREEN LENGTHS

The City of Albuquerque, NM has proposed using very long 2" diameter monitor well screens. The screens proposed are up to 40 ft. in length. They would sample groundwater through these screens with a low-flow volume well sampling pump. The main reason given by the City of Albuquerque for the long screens is to extend the useful life of monitoring wells installed at the former Coronado Landfill (the Philips Semi-Conductor Facility location). The groundwater levels are declining in the upper aquifer at this site at a rate of at least 6 in. per year.

The EPA's RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD, September 1986) recommends 20 foot maximum screen lengths for wells screened across the water table, with fifteen feet of well screen below the water table and five feet of well screen above the water table. The recommended minimum length of service for monitoring wells in the TEGD is thirty years. With a water level drop of approximately 6 inches per year at Philips, the fifteen feet of screen in the saturated

zone would last just long enough to meet the minimum recommended monitoring period.

I also discussed the long screen lengths with a low-flow pump manufacturer (QED). They sent me the references listed at the end of this memo. QED designs the low flow pump systems for use with short screen lengths (5 to 10 ft. in submerged length) for obtaining samples from discreet zones in an aquifer. Screening through several zones in an aquifer can result in a sample that is only representative of the entire range of depths screened and not just the depth for the pump intake. This use of longer screens with a low flow pump complicates the sampling and the interpretation of the results. It can result in a non-representative sample of an aquifer's water quality. The low flow sample pumps are designed to work through as short a screen length as is practical and are not recommended for use in very long screens.

Some hydrogeologists at NMED believe that the only way to know for sure which depth of the aquifer was being sampled was to set packers in between separately screened zones before pumping. Each screened zone would be separated in the well bore from the zones above and below with bentonite seals. The City of Albuquerque has installed this type of well in the past where more productive water zones were identified using down-hole cameras and flow logs. Albuquerque constructed this well to obtain discrete depth samples. However, this type of well installation can be very expensive.

Another drawback to long screen lengths with NMED, is the issue of potential cross-contamination of different zones which are screened in the aquifer. This occurs due to no control over mixing of water from various strata across which the well is screened. The open screen provides a pathway for contaminants from one confined water bearing zone to travel up, or down, to another, uncontaminated zone. An additional concern is the mixing of water inside the well column, especially in the open screened zone. Even with the use of low flow sampling pumps, there is no way of knowing if the water pumped from the middle of a 40 foot screen actually came from that depth, or if it is a mixture of the formation waters from across the entire screened interval.

NMED hydrogeologists familiar with Albuquerque's alluvial aquifer, prefer well screens no longer than 20 ft. in length (15 ft. below the water table and 5 ft. above the water table). In addition, experience with similar contaminants at the Digital site some 1 ½ miles south of the Philips site, has indicated that organic solvent contaminants may occur locally concentrated on aquitards within the aquifer. Contaminant concentrations may drop off rapidly just a few feet above the maximum concentration levels. Again, the occurrence of contaminants in thin zones

favors the use of shorter, more discrete screened intervals in monitoring wells.

The contaminants of concern (COCs) identified at the Philips Site are 1,1,2,2 tetrachloroethane, with a specific gravity of 1.59 and a solubility of 0.29% in water and perchloroethylene (tetrachloroethylene) with a specific gravity of 1.63 and a solubility of 0.015% in water. NMED hydrogeologists recommend detection well screens of less than five feet in length for the detection of contaminants that are denser than water and of low miscibility.

To Summarize:

I. Monitor wells are for the purpose of contaminant detection and not long term monitoring, at this stage of the investigation.

II. It is difficult to determine the exact depth of samples from a well screened across more than one water bearing stratum.

III. The manufacturer recommends that low flow pumps be used with short screen lengths to maximize their effectiveness in sampling from a discrete zone of an aquifer (references below.)

IV. Groundwater professionals within the NMED who have experience in the Albuquerque area with the Santa Fe Alluvial aquifer, as found beneath the Philips site, recommend short (i.e. 15 feet or less) screen lengths for detection monitoring wells. Effects that are detrimental to obtaining a representative sample include potential cross-contamination, mixing of water from different hydrologic source zones, and dilution of a plume's contaminant concentration levels.

V. The COCs at the Philips site are denser than water and not readily miscible. The type of contaminants identified at the Philips Site have been found elsewhere to occur as thin, discrete layers within aquifers at a depth where further downward migration is retarded by a less permeable layer. These types of contaminants may be more readily detected along a narrow range of depths using a shorter screened interval.

QED Supplied References:

1) Puls, Robert and Barcelona, Michael (1995), "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures", in EPA Groundwater Issue, December, 1995, 12 pgs.

2) Puls, Robert (1994), "A New Approach to Purging Monitoring Wells", in Ground Water Age, January, 1994, pgs. 18-19.

3) Schilling, Keith (1995), "Low Flow Purging Reduces Management of Contaminated Groundwater", in Environmental Protection, December, 1995, pgs. 24-26.