

Expert Evidence on Dating Pollution Discharges

by Mary Henifin and Gil Oudijk

Environmental litigation cases often hinge on determining the time frame of a contaminant release. For example, the age of a contaminant plume and the dates of ownership and/or operation can be compared to distinguish the responsible parties. Insurance coverage issues may also be clarified by determining the time frame of a release.

Methods for dating contaminant releases and standards of admissibility for this kind of evidence are outlined in this article. Successful presentation of admissible evidence may speed negotiated settlements of environmental disputes and enhance the chances for success at trial.

Retention of a qualified environmental expert is necessary to insure that the information presented to the court is deemed acceptable. In *Bahrle v. Exxon Corp.*,¹ the Appellate Division discussed the standards for qualifications of an expert. The *Bahrle* court required each expert to have experience in the area of knowledge at issue, and to examine the specific circumstances of the case.

According to the *Bahrle* court, the "jack of all trades" or "general industry" consultant may not qualify as an expert. The environmental expert should be a trained geologist, hydrologist, chemist or environmental engineer, with experience in the investigation of soil and groundwater pollution cases. With respect to dating contaminant releases, the expert's background in groundwater hydrology, soil classification and contaminant fate and transport are particularly relevant. For example, a professional engineer (P.E.) or professional geologist (P.G.) without training, background or experience in hydrology or environmental science may not be well-qualified.

Site History

Experienced environmental consultants will begin any environmental investigation by researching historical land use. A detailed knowledge of past operations, chemical inventory and waste disposal practices is essential for identifying source areas, predicting the suit of chemicals present and estimating the time of the release.

In some cases, it is sufficient to determine when a particular contaminant was used or stored at the site to determine when the release occurred. For example, if an oil terminal stored leaded gasoline between 1960 and 1980, and leaded gasoline is present in the underlying aquifer, it is reasonable to assume that the release occurred during this time period.

The following information sources are commonly reviewed to obtain an understanding of the site history:

- historical tax maps, insurance maps and zoning maps;
- historical aerial photographs;
- government files, including reports issued by the state environmental protection agency, and health and water department records; and
- industry records.

While site history may be useful to narrow possible dates and responsible party candidates, it may not always provide sufficient information to pinpoint the date of the discharge or to distinguish between dischargers. For example, in an area with regional groundwater problems, several contaminant sources may have discharged during different time periods. However, once the site history has been obtained, more sophisticated methods may be undertaken to identify the contaminant source and determine the date of dis-

charge. These methods are briefly discussed below, and include use of groundwater flow rates, identification of index chemicals, use of isotopes and hydrocarbon fingerprinting.

Groundwater Flow Rates

Environmental investigations often include the installation of monitoring wells. Water levels are collected from the wells, and groundwater elevations are calculated. Based on the permeability of the aquifer and the slope of the water table, the groundwater flow direction and rate are determined. Based on the distance the contaminants have migrated, the travel time can be estimated by taking into account various factors. The travel time may then be used to back-calculate the time of the discharge.

Index Chemicals

The identification of certain chemicals in soil and groundwater can be used to determine the minimum and maximum age of a contaminant release. For example, methyl tertiary butyl ether (MTBE), a gasoline additive, was first introduced in 1980. Therefore, the presence of MTBE in soil or groundwater samples indicates that the release occurred after 1980. Other additives with known periods of use include tertiary butyl alcohol, first used in 1969, and tetraethyl lead, phased out in 1988.

Isotopes

An isotope is an atom of a specific element containing the normal number of protons, but an abnormal number of neutrons. The identification and quantification of isotopes in groundwater can be used to estimate the age of a contaminant release. For example, the isotope tritium was first introduced to the atmosphere in 1953.

through the explosion of hydrogen bombs. Consequently, precipitation that recharged the subsurface after 1953 contained tritium.

Based on the known half-life of tritium, the age of the groundwater can be calculated. Therefore, if the concentration of the isotope in a contaminant plume is determined, the age of the release can be estimated. Problems with this method include fluctuations due to unusual environmental events.

Hydrocarbon Fingerprinting

The relative age of petroleum released to soil and groundwater can be determined with a laboratory analytical method known as fingerprinting. Petroleum products, in particular fuel oil

and gasoline, degrade or "weather" as a function of the following conditions present in the subsurface: 1) the type and quantity of bacteria; 2) the geologic framework; and 3) the moisture content. Fuel oil is composed of several thousand compounds. Based on the relative quantities of these compounds, the degree of weathering and relative age can be determined. A problem with fingerprinting is that on-site environmental conditions may affect the sample to an unknown degree.

Admissibility of Methods

The environmental expert must be prepared to describe the methodology used, and the potential error rate, for the opinion to be admissible. Even if the

final dating opinion is not considered to be "generally accepted," it would still be considered reliable if it is "based on a sound, adequately founded scientific methodology involving data and information relied upon by experts in the scientific field."²

In *Daubert*, the United States Supreme Court offered a checklist to determine admissibility. The case has been followed by New Jersey courts.³ In *Daubert*, the following relevant, but not dispositive, checklist is to be applied by the trial judge in determining issues of admissibility.

- 1) Has the scientific knowledge been tested?
- 2) Was it submitted to peer review and publication?
- 3) What was the known or potential rate of error?
- 4) Is the theory or technique generally accepted?

Expert opinion concerning dating of environmental discharges should be presented with these questions in mind. *In limine* motions may be filed in an attempt to exclude expert testimony, and parties will be put to the test to provide adequate foundation for the scientific testimony. With foresight and adequate preparation, evidence of the timing of environmental discharges can help prove or disprove causation in environmental cases.

Endnotes

1. 279 N.J. Super. 5 (1995).
2. *Rubanick v. Witco Chem. Corp.*, 125 N.J. 421, 449. See also *Landrigan v. Celotex Corp.*, N.J. 404 (1992) and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1994).
3. See e.g. *Bahrle*.
4. N.J.R.E 104(a).

Mary Henifin is a partner at Goldshore & Wolf, where she represents clients in environmental and commercial litigation matters. Gil Oudijk is a principal in the environmental consulting firm, Hydrotechnology Consultants, Inc.
