

## BACKGROUND

The Naval Air Warfare Center (NAWC) is a 163-acre facility in north-eastern Indianapolis, Indiana, that was operated by the Department of the Navy since construction in 1942. At the Center, the Navy manufactured, developed, and tested aircraft-weapon controls and systems. The NAWC became part of the nationwide program of military base closings and, in early 1996, the Navy began a process to privatize rather than close the NAWC. Privatization is an innovative approach intended to preserve jobs and the physical plant and to increase the local tax base. By early 1997, the City of Indianapolis had leased much of the NAWC from the Navy. The City then leased the physical plant to Hughes Technical Services, a major defense contractor, who hired many of the former NAWC employees. To complete the privatization, the Navy must address potential environmental contamination at the NAWC, according to Federal and State requirements, including the Base Realignment and Closure (BRAC) procedure specified by Federal law. The Navy then can transfer ownership of the property to the City and Hughes.

## INVESTIGATION

To support environmental investigation and potential cleanup the Navy will do to convert the facility to private ownership, the U.S. Geological Survey (USGS) was requested to investigate the hydrogeologic framework in the vicinity of the NAWC and to participate in the BRAC project team that coordinates the environmental activities. Work by the USGS preceded and helped guide contamination investigations by Navy contractors.

The objectives of the USGS investigation were to

- define the thickness and extent of aquifers,
- estimate selected hydrogeologic characteristics,

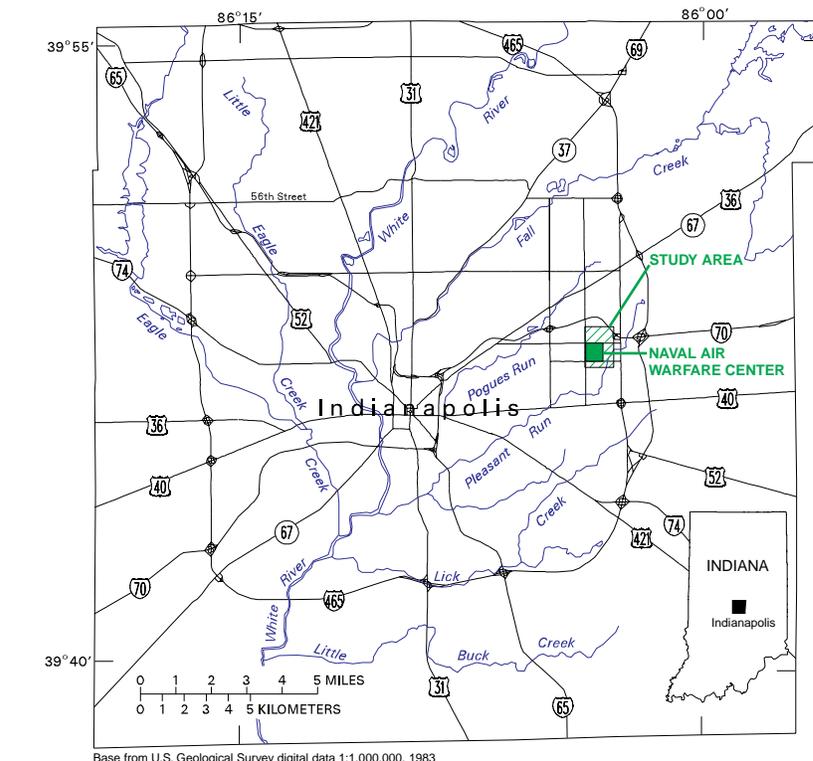


Figure 1. Indianapolis, Indiana, and location of study area and Naval Air Warfare Center.

- and describe ground-water flow and natural ground-water quality.

A field-investigation work plan, quality-assurance plan, and health and safety plan for the USGS activities were coordinated and approved through the BRAC project team, which includes representatives from the Navy, the U.S. Environmental Protection Agency, the Indiana Department of Environmental Management, the USGS, and several Navy contractors.

During the field investigation at the NAWC in spring 1996, the USGS

- constructed 14 monitoring wells,
- collected nearly continuous cores of sediment at 6 deep boreholes,
- analyzed particle-sizes of sediment samples, and
- collected 2 kinds of borehole geophysical logs.

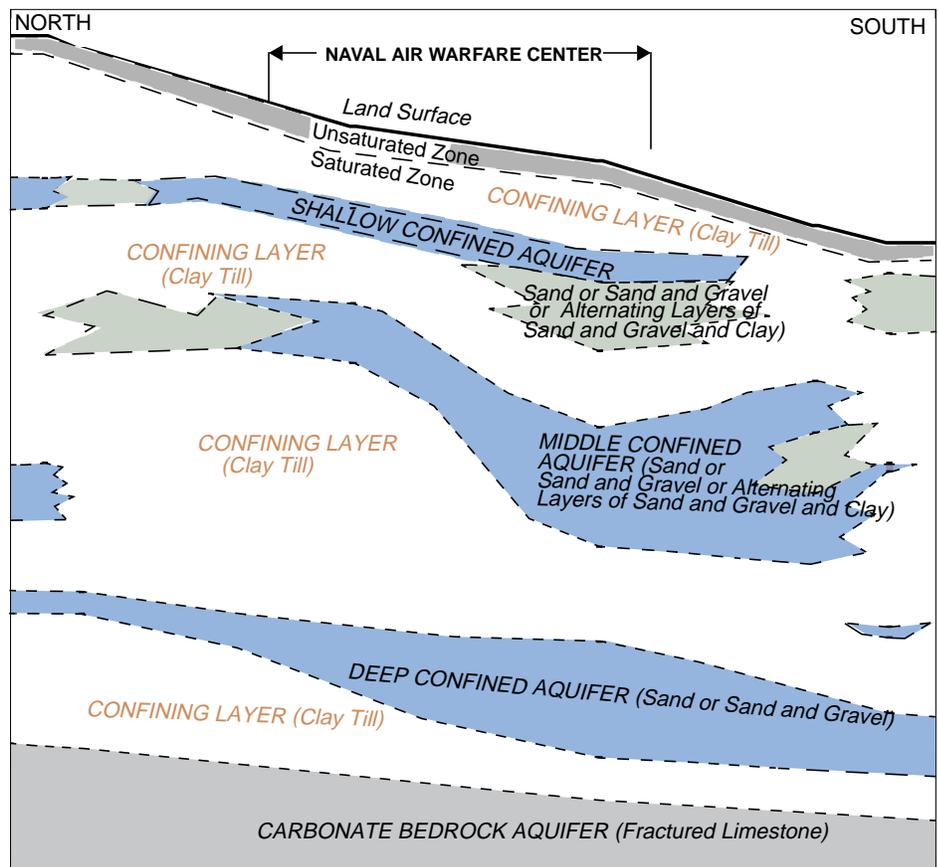
Drilling and well installation were done with hollow-stem auger by the USGS Central Region Drilling Unit.

In the 14 wells, the USGS made 46 single-well aquifer tests, measured water levels each month, and collected 1 round of water-quality samples. In a 1,600-acre study area that includes the NAWC, the USGS did a synoptic water-level measurement at 23 wells and 1 surface-water site. Aquifer tests and water-level data were used to calculate ground-water flow velocities and directions. Analyses of the water samples were used to describe ground-water quality. To detect potential subsurface contamination, the USGS did field screening analysis for volatile organic compounds in 220 sediment samples. Because of potential contamination at four sites, the USGS had to adjust the field investigation, including the collection and testing of sediments, fluids, and ground water from drilling well construction, and equipment cleaning.

## HYDROGEOLOGY

The USGS developed a conceptual model of the hydrogeology of the study area. The model was developed from the USGS field investigation with information from previous studies of geology and the aquifer system in northeastern Indianapolis. The conceptual model includes the following major characteristics:

- Three confined or semi-confined aquifers consisting of sand, gravel, sand and gravel, or alternating layers of sand and gravel and clay occur in the 150 feet of glacial till overlying a carbonate bedrock aquifer.
- The aquifers generally are separated by confining layers of glacial till sediments (shown as “clay till” in fig. 2).
- The shallow and middle aquifers vary considerably in thickness and horizontal extent, although they appear to be connected horizontally beneath the eastern and southern parts of the NAWC.
- In some areas, the aquifers may be vertically connected.
- The deep aquifer and bedrock aquifer are vertically separated from the shallow and middle aquifers and appear to extend beneath all of the study area.
- Recharge occurs locally from infiltration of precipitation.
- The average linear horizontal ground-water-flow direction in the shallow and middle aquifers is oriented to south-southeast, and the average velocity ranges from about 0.5 to 1.25 feet per day.



**Figure 2.** Conceptual diagram of the hydrogeology in the vicinity of the Naval Air Warfare Center, Indianapolis, Indiana (vertical scale exaggerated).

- Ground-water quality was similar among wells in the same aquifer and was consistent with the conceptual model of the hydrogeology.
- Ground water in the shallow aquifer discharges primarily to Pleasant Run, a perennial stream flowing south near the southeastern boundary of the NAWC (fig. 1).

Data were not sufficient to identify the discharge area of the middle aquifer and the flow velocity and discharge areas for the deep and bedrock aquifers.

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Additional earth science information can be found on the USGS “Home Page” at <http://www.usgs.gov>

or the Indiana District Home Page at <http://srv1dinind.er.usgs.gov>

For more information on all USGS reports and products (including maps, images, and computerized data), call 1-800-USA-MAPS.