Eger/EPA

Upper: Contour map shows electrical conductivity anomaly (circular patch) that marked a well. Lower: River of oil covers Houchins' Spring in July 1992. EPA temporarily pumped the spring dry to find and plug a perhaps 60-year-old well.

ination in mind — securing this money for terrestrial leaks initially proved challenging, he says.

According to Eger, however, the potential threat to humans is "infinitely higher" from inland oil spills than from offshore ones. He notes, for instance, that "oil contains some of the worst carcinogens known. And in groundwater wells adjacent to oil wells, levels found are typically two to three times the drinking-water standard for those chemicals."

Not only do an estimated 150,000 unmapped and abandoned oil wells exist within Kentucky, he reports, but it's likely a large number of similar sites also litter states drilled during the oil industry's initial boom — especially Pennsylvania, West Virginia, Tennessee, parts of southern Illinois and Indiana, and probably Michigan.

Eger's cleanup efforts highlight a largely unrecognized problem, the prevalence and importance of terrestrial spills, says James H. Parker, president of Industrial Marine Service, Inc., in Norfolk, Va. Parker, whose firm primarily cleans oil spills in water environments, notes that inland spills are becoming a fast-growing part of his business.

Increasingly, such pollution managers are turning to geophysical soil probes, notes Jay Rodstein, formerly with EPA and now with the National Oceanic and Atmospheric Administration in East Lansing, Mich. He recalls using such probes in 1985 to hunt buried and abandoned coal-tar pits. *— J. Raloff*

Images hint at comet reservoir, breakup

If detecting one large object at the outskirts of the solar system provides supporting evidence for a proposed — but never observed — reservoir of comets, do two such objects offer convincing proof? Comet hunter David Jewitt of the University of Hawaii in Honolulu is betting they will.

For the second time in seven months, he and Jane X. Luu of the University of California, Berkeley, have imaged a body that lies beyond the orbit of Neptune. The researchers suggest that the object, one of the most distant ever detected in the solar system, belongs to a primordial storehouse of comets that astronomers have long theorized should exist. Known as the Kuiper belt, this ring-shaped storehouse would serve as home base for short-period comets, which visit the inner solar system at least once every 200 years.

The mysterious body, known as 1993 FW, lies too far away — and researchers have made too few measurements — to determine whether it is indeed a comet, Jewitt says. But 1993 FW appears to measure about 250 kilometers across and lies roughly 42 times as far from the sun as Earth does, he adds. That distance, notes Jewitt, corresponds to the inner reaches of the proposed Kuiper belt. He and Luu reported their work in a March 29 circular of the International Astronomical Union.

Jewitt says the new finding, coming on the heels of his team's earlier one (SN: 9/26/92, p.196), indicates that Kuiper belt objects are "waiting to be found. . . . We are surrounded by a ring [of comets], but we didn't know it."

He and Luu observed 1993 FW with the University of Hawaii's 2.2-meter telescope atop Mauna Kea. Scanning the same tiny patch of sky examined in their earlier work, they spotted a faint, slow-moving object late last month.

The slow speed indicates that 1993 FW lies relatively far out in the solar system, says Jewitt. But he adds that many more measurements are needed to determine if it has the circular orbit required of a Kuiper belt resident. If 1993 FW instead has a highly elliptical orbit, it might eventually reach the inner solar system and could not be a current resident of the reservoir, he notes. Jewitt says that studies of the previously detected object, 1992 QB1, have now revealed that it indeed has a nearly circular orbit.

Brian G. Marsden of the Smithsonian Astrophysical Observatory in Cambridge, Mass., says he looks forward to the eventual detection of a Kuiper belt object caught in the act of leaving the belt. "If nothing ever leaves the belt, what good is it?" asks Marsden. After all, he notes, a key reason for believing in this reservoir is that its existence can explain how a seemingly endless supply of short-period comets frequents the inner solar system.

Comets also take center stage in another dramatic finding. Astronomers have detected a group of at least 18 glowing objects, lined up like pearls on a string, that may be the fragments of a single comet that broke apart sometime last year.

A trio of scientists using the 0.46-meter telescope atop Mt. Palomar, near Escondido, Calif., battled unfavorable weather conditions in late March to make the discovery. Caroline S. Shoemaker and Eugene M. Shoemaker of the U.S. Geological Survey in Flagstaff, Ariz., and amateur astronomer David H. Levy of Tucson, Ariz., reported the find in a March 26 circular of the International Astronomical Union.

Luu and Jewitt

Image shows trail of bodies that appear to be the icy fragments of a comet.

The trail of fuzzy, comet-like objects appears to lie near Jupiter, and Marsden says the breakup could have come about if a large comet passed too close to the giant planet — possibly last July, according to his orbital calculations. Jupiter's gravitational tug might have caused the parent to shatter, and the freshly exposed ice layers of each fragment would glint brightly in sunlight, he says.

Jewitt, who along with Luu has identified 18 fragments so far, says he favors another explanation. He suggests that the fragments arose because a parent comet was spinning so rapidly that gravity could no longer keep it intact. Jewitt adds that astronomers have documented few cometary breakups and that none has been well studied. Closely tracking the recently found fragments, he says, could shed new light on why comets sometimes split apart.

— R. Cowen