

other was lofted last November with the first launch of a Titan rocket since a similar vehicle exploded at the Vandenberg Air Force Base in April 1986.

According to William Burrows, author of *Deep Black: Space Espionage and National Security* (Random House, 1986), these are the last two KH-11s. They will be superseded by new generation of spy satellites, known as KH-12s, which will be able to maneuver to change the area of their coverage. They will carry their own fuel into orbit and will be periodically topped up by astronauts from the space shuttle.

The original plan was to launch the KH-12s on shuttle flights from Vandenberg, according to Burrows. The Challenger disaster, followed by the decision to mothball the shuttle launch complex at Vandenberg, have put a crimp in these plans, however. John Pike, of the Federation of American Scientists, who closely follows what public information there is on the highly classified spy satellite program, says one KH-12 is currently scheduled for a shuttle launch next March from Cape Canaveral, followed by a second in April to be launched by a Titan from Vandenberg. Two more are believed to be planned for launch in subsequent years for a total of four in orbit simultaneously. With shuttle servicing, the KH-12s are estimated to last about 15 years.

There is speculation that the Senate Intelligence Committee may be calling for one or two more KH-12s to increase the frequency of coverage, especially of regions where mobile missiles are deployed. Pike and Jeffrey Richelson, author of *The U.S. Intelligence Community* (Ballinger, 1985), point out that several interests will be competing to position the KH-12s for their own needs. These range from the Air Force for targeting purposes to tactical commanders who want information on troop movements in Eastern Europe. The committee may therefore be concerned that treaty monitoring could be shortchanged.

Another likely proposal is for a fleet of radar-imaging satellites that can penetrate cloud cover and see at night. Although the KH-11s and KH-12s are believed to have infrared capabilities which provide some night vision, they cannot see through clouds. Radar imagers have been flown on the shuttle, but the first public indication that the technology is also being developed for intelligence purposes came last year in a book on the CIA written by *Washington Post* reporter Bob Woodward (*Veil*, Simon & Schuster, 1987), in which he detailed a dispute over funding for a radar satellite code-named Lacrosse. Richelson says he believes the satellite is now ready for launch. ■

COLIN NORMAN

## EPA Bars Use of Nazi Data

Environmental Protection Agency (EPA) Administrator Lee Thomas last week barred the use of human data from Nazi experiments in assessing the risk of a hazardous chemical now under regulatory review.

Thomas's decision came after he received a letter signed by 22 agency scientists protesting the use of the information. The incident has touched off a dispute among EPA scientists and others about the ethics of using the results of the Nazi experiments and, also, about the scientific quality of the studies.

EPA is currently considering air pollution regulations on phosgene, which is widely used in the manufacture of pesticides and plastics. A billion pounds of phosgene is produced annually in the United States. As a part of the agency review, EPA scientists have been developing a new mathematical model to analyze how different doses affect the lungs. Scientists in EPA's pollution assessment branch proposed using the Nazi data based on the recommendations of ICF-Clement, Inc., an environmental consulting firm based in Washington, D.C. EPA had contracted with the firm to develop a dose-response model and provided the Nazi data to the firm for consideration.

In assessing risk, scientists often depend solely on animal models to predict effects on people. Human data are preferred, but they are seldom available. With phosgene, the Nazi experiments provided "comparatively more information" than the existing anecdotal data and epidemiological studies of workers, says John Vandenberg, the EPA project officer in charge of the phosgene review.

The Nazis conducted the experiments on prisoners in France to develop an antidote to phosgene, which had been used in chemical warfare. Phosgene destroys enzymes in the lungs, causing fluid buildup, which can lead to death by "drowning." The Nazi's reports about the experiments were revealed during war crime trials in France when they were entered as evidence.

Judith Bellin, an EPA toxicologist who initiated the protest letter, called the data "valueless" with regard to their scientific quality. They were flawed on several counts, she asserts. The reports themselves note that the prisoners were "almost all in a weak and underfed condition." They did not say how pulmonary edema was measured. Different kinds of controls should have been used. The weight and sex of the subjects were not recorded. And Bellin says that it looks as though the Nazis "fiddled with the data" because results from only 36 subjects are reported although 40 are mentioned in the description of the methodology.

Vandenberg says, "We won't argue that the experiments were well reported or well designed, but compared to what we had, they offered a measure of improvement. They obviously had a lot of flaws. But we felt compelled to use it because it provided dose-response data."

Todd Thorslund, vice president of ICF-Clement, also defends using the information. For example, the poor health of the prisoners is not necessarily a drawback in developing a model, he said. EPA is often concerned about the health of sensitive populations, so using the Nazi results produces a conservative model. The lack of information about sex and weight of the subjects is not very important in this case, he said, because phosgene is so toxic that "it's the dose in the air that makes the difference."

If similar information about exposure and effects had been available from studies examining accidental exposure to workers, these data "would have been considered gold," said Thorslund. Ila Cote, an EPA scientist who helped oversee the project concurs. She said, "If unintentional exposure had occurred in an occupational setting [and produced equivalent information], we would have used it."

Bellin says that no matter what the quality of the data is, the Nazi experiments were so heinous that the information should not be utilized. In the letter to Thomas, agency scientists said that some of them "feel that the data, no matter how valid, should never be used." But "some have suggested that such data (if scientifically sound, and verifiable) should be used if some 'good' to humans can result."

It is not clear if the human data would have predicted a different dose-response effect compared to using animal data alone. In light of Thomas's prohibition against using the Nazi results, "we're going to look at the animal data now," Vandenberg says. ■ **MARJORIE SUN**