able to provide time histories vital for such studies as changes in the pulsation rate of pulsars. Guided by Stephen S. Holt of NASA's Goddard Space Flight Center (the only U.S. experimenter on UK-5), it will cover a range of from 3 to 6 keV.

The second surveying-type instrument covers a wider energy range—1.5 to 20 keV—but with a viewing angle of only five degrees. Unlike Holt's imaging device, it is a proportional counter (for which 5 degrees is relatively broad coverage) that can select a balance between accurate positioning and high-resolution X-ray spectra.

Both of these experiments are mounted on the side of the satellite, so that they can scan the sky as the probe turns. The other four are at the top end where they can look at selected, fixed targets out along the probe's spin axis. One of the sensors can measure X-ray polarization as slight as 2.5 percent in objects as bright as, say, the Crab Nebula.

UK-5, which will be renamed Ariel 5 once it is safely in orbit, is the fifth in a series of U.S.-U.K. cooperative satellites, as opposed to what NASA calls "reimbursibles," in which the space agency merely hires out its launching capability to another country. In a cooperative agreement, each country pays for its own participation.

The probe is being launched from the Italian-operated San Marco Launch Facility off the Kenyan coast because the modified "Texas tower" is one of the few facilities whose latitude is suitable for putting satellites directly into equatorial orbits. NASA has none; France has one at Guiana, but for a variety of reasons, some of them no doubt political, NASA has never flown a satellite from it. UK-5 could have been launched from Cape Canaveral but the additional energy required to move the satellite down to the plane of the equator would have necessitated a much larger, more expensive booster such as a Delta rather than the simple, solid-fuel Scout. □

Spaceport on the high seas

Warm wavelets lap at the steel pilings, a few token clouds dot the intensely blue sky and soft breezes decorate the 88-degree air. The nearest land is three miles away, yet keeping the sunlight from the inviting ocean is a shadow fully as large as a football field. About a third of a mile away is another darkening on the water, a triangle about 120 feet on a side. Three stories overhead, perched on their pilings, are the shadowmakers: the two huge decks of the San Marco Launch Facility, one of the world's most unusual gateways to space.

The project began in Italy in 1965. Starting with a huge floating platform once used in drilling oil from beneath the sea floor, engineers spent a year refitting it with sheds, wiring and other equipment for an entirely new role. Towing their ponderous prize across the Mediterranean and through the Suez Canal, they headed down the northeast coast of Africa, finally anchoring about 2.5 degrees south of the equator in international waters off the coast of Kenya. There it became the Santa Rita control platform, nerve center for satellite launches aimed directly at equatorial orbits.

Near Santa Rita, on 20 steel legs, was built San Marco, the launch pad itself, connected to the control complex by half a dozen undersea cables. Its 27,000 square feet encompasses a veritable industrial complex, replete with storage sheds, assembly racks, checkout facilities, an 80-foot launch tower and "the pit." The pit is actually a hole, open to the sea beneath, through which rockets vent their exhausts as they take off.

The complex is independent of the mainland, with its own generators for power. The launch crews, however, live ashore, in a base camp about 12 miles from the Kenyan resort town of Malindi, and commute to their exotic outpost via a ferry service of cabin cruisers. As many as 140 Italian engineers and technicians staff the complex, about half from the Italian air force and the rest from the Aerospace Research Center of the University of Rome, which operates the facility. Because the only rocket that ever launches satellites from San Marco is the U.S.-built Scout, about 20 Americans are usually there as well, with perhaps 20 more if the upcoming launch is of a U.S. satellite.

The first satellite to use these seagoing spaceports was San Marco II, a U.S.-Italian cooperative atmosphere probe launched on April 26, 1967. Next came the first U.S. Small Astronomy Satellite (SAS) in 1970, which was renamed Uhuru in honor of Kenyan Independence Day, followed in 1971 by San Marco III and by a U.S. Explorer-series probe called the Small Scientific Satellite. The most recent launch was the Nov. 15, 1972, firing of the second SAS. Next week the U.S.-British UK-5 X-ray observatory will join the list, followed early next year by SAS-3.

Study shows faulty trace analyses

When environmental chemists analyse animals, plants, air and water to determine the levels of heavy metals or other pollutants present, they are searching for tiny amounts of the substances. Effluent regulations are based in part on these measurements, so accuracy is important. A report in the Sept. 13 NATURE indicates that most analysts use faulty techniques and make erroneously high assessments of pollutant levels.

Chemists Tsaihwa J. Chow of the Scripps Institution of Oceanography and Clair C. Patterson and Dorothy Settle of the California Institute of Technology report levels of lead in tuna that "lie so far away from generally accepted levels . . . that analysts may find them difficult" to accept. They found that tuna muscle tissue contains only about .0003 parts per million of lead, well below the level toxic to humans and hundreds of times lower than most published levels. They found, however, that canned tuna (muscle) is contaminated with lead levels almost a 1,000 times higher than those found in the flesh before processing. The team suspects that contamination occurs during food processing.

Their report grew out of a workshop held two years ago by the National Science Foundation's office for the International Decade of Ocean Exploration. Questions had been raised about the uniformity and accuracy of ocean water trace analyses, and the participants decided to conduct a blind study. Unlabeled samples of sea water, standardized at Caltech with sensitive analytical methods, were sent to seven well-known laboratories in the United States and England. Suspicions were confirmed: Not one of the laboratories could report reliable values. The Caltech team then decided to determine lead concentrations in tuna as a reference point for other investigators. They used stable isotope dilutions, mass spectroscopy and clean-lab technique.

The implication of this study, Patterson says, is that all existing analyses are "highly suspect and probably wrong," including contamination levels upon which effluent standards are currently based. And although the levels are lower than previously suspected, he warns that pollution is still a major problem. "The total amount of lead in tuna is small but we feel that the .0003 parts per million still represents unnatural contamination, probably from industrial lead." He says the National Academy of Sciences is currently studying the report and the question of faulty trace analysis. □