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2 May 1986

# FIRE IN REACTOR MAY BE OUT, NEW U.S. PICTURES INDICATE; SOVIET SAYS FALLOUT IS CUT

By BERNARD GWERTZMAN

Special to The New York Times

WASHINGTON, May 1 — The United States said today that the Soviet Union might have smothered the fire that raged for the last five days at a nuclear reactor in the Ukraine.

In addition, a French communications satellite took pictures today that suggested the fire might have been smothered, a report from Sweden said.

The accident at the Chernobyl reactor, 70 miles north of Kiev, spewed radioactive material into the atmosphere that has drifted into many European countries.

Only a day after it predicted that the severely damaged reactor might continue to burn for weeks, an American interagency panel said this afternoon that the latest Air Force reconnaissance photos made it "plausible" that the Soviet Union had put out the fire, as Moscow contended Wednesday afternoon that it had done. But the group said it lacked definitive evidence to make a firm conclusion.

## Helicopters Sighted at Plant

American officials said special Soviet civil-defense forces, in helicopters, had been observed dropping material, believed to be wet sand, over the fire into the graphite that encased the nuclear fuel rods in the reactor.

The task force members also said they could not confirm speculation that there was damage to a second reactor at the Chernobyl plant. They said a possible "hot spot" close to the damaged reactor was not another reactor but some other industrial building. There are four reactors at Chernobyl.

The American interagency panel and European nations said the air mass carrying radioactive particles was now widely dispersed throughout northern Europe and Polar regions and should begin to move east over the next week.

There were these developments:

¶The Soviet Government said decontamination teams were cleaning up the area around Chernobyl, where it said 2 people were killed and 197 were hospitalized, of whom 18 were listed today as in serious condition. It said the amount of radiation near the power station had declined.

¶Moscow turned down an offer by President Reagan to supply assistance, but it invited Dr. Robert Gale, chairman of the International Bone Marrow Transplant Registry, to fly to the Soviet Union to provide medical assistance to the victims of the disaster. Bone-marrow transplant is used to help victims of severe radiation sickness. The Russians have also solicited similar non-governmental assistance in Europe, while declining direct government offers.

¶In a highly unusual move, a Soviet diplomat appeared before a House committee looking into the affair. The diplomat said that the consequences of the accident were not over and that people both inside and outside the Soviet Union still faced danger.

The Soviet Government, facing worldwide criticism for the paucity and delay in the information it has made available, made undertook a major effort to persuade other governments that the situation was under control and that steps were being taken to clear up the area near the reactor. A violent explosion apparently occurred at the reactor last Saturday, but became known to the outside world only last Monday.

There continued to be uncertainty about the number of casualties involved in the blast and the subsequent fire and radioactive dispersion. Secretary of State George P. Shultz, without citing exact figures, said in Indonesia that the United States believed the casualty total exceeded the official Soviet figures "by a good measure." But the American interagency panel maintained that it still had no firm numbers to cite in contradiction to those announced by Moscow.

## 'A Huge Problem'

¶When asked if the Soviet Union now had the situation under control, a member of the American interagency panel indicated that the problem was far from over.

¶"Radiation is no doubt deposited on the ground, people have been exposed," the member, Harold Denton, said. "They have a huge problem in regard to cleanup."

¶Lee M. Thomas, administrator of the Environmental Protection Agency, who heads the panel, said, "To us, it is a major accident, probably and possibly the most major accident at a nuclear facility that has occurred."

¶"It is a significant cause for concern," he said.

¶On Wednesday, Mr. Denton, director of the office of reactor regulation in the Nuclear Regulatory Commission and a member of the panel, said the fire in the damaged reactor, known as unit four, was likely to burn for weeks unless it was put out. He said then that it would be difficult to extinguish.

¶This morning, Mr. Thomas said on television that the fire was continuing to burn, although the amount of radioactive material emitted would grow progressively smaller as the fire continued.

¶But according to several Administration officials, when the interagency panel met with intelligence officials later this morning to examine the latest reconnaissance photos, a debate

ensued as to whether there still was a fire burning.

Photos taken Wednesday, officials said, clearly showed white smoke coming from the damaged reactor. The photos taken today lacked such smoke, they said, but instead had a kind of haze over the area, which some analysts believed might be smoke and others said was not.

This new intelligence led to a re-evaluation of what the United States had been saying, one official said. "It could be that the Soviet Union has actually put it out," an official said.

Charles E. Redman, a State Department spokesman, said that "concerning the fire, the best we have is that we have seen reports that the fire is out."

"We, of course, hope that that's true," he said, "but we can't confirm that independently as yet. I can't confirm that the fire is out, so conversely, neither could I confirm that it's still burning."

If, in fact, it turns out that the fire has been smothered, it will somewhat enhance Soviet credibility. Daily, brief reports from Moscow have been greeted throughout the week with deep skepticism.

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#### **Shultz Faults Soviet**

This morning, speaking with reporters in Indonesia, where he is accompanying President Reagan, Mr. Shultz castigated the Soviet Union for failing to meet its obligations by providing "full and prompt information" to other nations that might be contaminated from the Chernobyl accident.

"I think by this time we have a much fuller picture than the Soviets are presenting to us," Mr. Shultz said, "or, for that matter, to their own people."

He declined to estimate the number of casualties, except to say that the number exceeded the total announced by the Russians "by a good measure."

Much of the concern on Wednesday was whether another "hot spot" seen on satellite photos of the Chernobyl plant was that of the adjacent reactor, unit three. If it had exploded in a way similar to unit four, it would have led to more radioactive material being spewed into the atmosphere.

Mr. Denton said today that "the data we have today continue to support the view that unit three is not involved in this event."

#### **State Dept. Cautions on Travel**

The interagency panel noted that the State Department had recommended against traveling to the Kiev area, but had decided not to advise against travel to the Soviet Union, Scandinavia and Eastern Europe, the areas hit hardest by the release of radiation materials.

But the department urged caution. "Americans planning travel to the Soviet Union and adjacent countries," the department said, "should carefully monitor press reports on this rapidly changing situation to make as fully informed a decision as possible with respect to their travel plans. They should bear in mind that many of these countries have reported increased levels of radiation in the environment."

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# Soviet cleanup

## Experts: Water, soil work may take 'years'

By HARRISON RAIME

News Washington Bureau

WASHINGTON —It will cost the Soviets many billions of rubles to clean up the worst nuclear reactor disaster in history and it will take "months and years" to decontaminate water and soil laced with deadly levels of radioactivity, American experts predicted yesterday.

The staggering cost and danger involved in a cleanup might force the Soviets to declare some of the region a "dead zone" off-limits to all humans, according to one U.S. government source.

"There's every indication there's widespread serious contamination around that plant (at Chernobyl)," said Harold Denton, director of nuclear reactor regulations at the Nuclear Regulatory Commission. "A lot of long-term nuclides (radioactive particles) are going to be

there a long time in the food-stuffs and in the water."

On NBC-TV's "Meet the Press," Denton said he thought land near the plant "would have to remain unused for a long time"—a period he said would be "months and years."

Must make a choice

One American nuclear expert put it more bluntly: "The Soviets will have to go one of two directions in coping with the most contaminated part—either they'll use half-measures to decontaminate and bring it back into production while lying to their people, the way they have so far, or they'll realize there is no cost-effective way to bring that land back to life for many, many years and will just declare it off-limits to everybody."

The Soviets reportedly faced a similar situation 30 years ago when an explosion contaminated a wide area near Kyshtym in the eastern Ural Mountains. According to published reports from CIA documents and emigre

Soviet scientists, 30 villages were abandoned after that accident, more than 100 square miles were declared a "dead zone" and a river was rerouted to avoid contamination.

Meanwhile, officials at the interagency task force monitoring the accident and its fallout said the radioactive plume was spreading both east and west—now straddling half the planet.

It was bringing more toxic material into Europe and continuing its journey to the Pacific Ocean, depositing higher than normal levels of radioactivity in a rainfall about 100 miles from Tokyo yesterday morning.

It will not arrive in the United States for "several days, if at all."

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ON PAGE 7-A

WASHINGTON TIMES  
5 May 1986

# Summit leaders expected to rap Soviets over Chernobyl secrecy

By Mary Belcher  
THE WASHINGTON TIMES

TOKYO — President Reagan and six other world leaders are expected today to denounce Soviet secrecy regarding the Chernobyl nuclear disaster and call for prompt and full disclosure of any future accidents.

After privately discussing the power plant accident at a three-hour dinner last night, the summit leaders ordered their aides to draft a statement on the disaster that occurred 10 days ago.

White House spokesman Larry Speakes said the leaders agreed on the need to strengthen nuclear safety procedures and to establish requirements for timely accident reports.

Since the Chernobyl accident April 25, administration officials said they have received more information from unnamed intelligence sources than from the Soviet government.

They say they still do not know the cause or extent of the accident, the number of dead and injured, and whether the fire at the power plant has been extinguished or continues to smolder.

Mr. Speakes said he did not know if the seven Western leaders will appeal as a group to Soviet leader Mikhail Gorbachev for full disclosure of the Chernobyl accident. Mr. Speakes said each of the summit nations — including the United States, Britain, Canada, Italy, France, West Germany and Japan — has contacted the Soviets separately.

The leaders last night discussed making the Vienna-based International Atomic Energy Agency the enforcement vehicle for international cooperation on nuclear safety and accident reporting.

White House Chief of Staff Donald Regan called Soviet secrecy about the Chernobyl accident "an outrage."

"We think that with over a third of the world's population directly af-

ected by this accident, that they have a moral obligation to tell the world what's going on," Mr. Regan said on NBC-TV.

"To try to stonewall it, to keep the information themselves and let the rest of the world try to figure out whether they're in danger or not, is beyond what civilized nations should do," Mr. Regan said.

Secretary of State George Shultz said there is considerable doubt that only two people died in the accident, as the Soviets contend.

He said on ABC-TV yesterday that U.S. photographs show "intense" heat and radiation levels in the vicinity, as well as fire engines and other emergency equipment remaining at the site.

Mr. Speakes said the Soviets "claimed" to have used helicopters to drop sand, lead shot and boron on the fire. He said the United States has not been able to confirm that the fire is out.

A team of medical experts was dispatched over the weekend to the U.S. Embassy in Moscow to determine whether the power plant accident harmed American embassy employees.

Mr. Speakes said the United States is also attempting to collect data from several countries neighboring the Soviet Union "that could prove essential to evaluating the accident" in the absence of information from the Kremlin.

The Soviet Union, which did not announce the accident until three days after it occurred, has declined an offer of U.S. technical and medical help.

"We have nothing but sympathy for the Soviet Union on this," Mr. Speakes said on Cable News Network. "We understand that they have a major problem. If we can be helpful, we'd like to be."

Administration officials yesterday said the U.S. experts sent to Moscow would monitor the health of embassy employees.

They denied that the move would

allow the Soviets to quietly enlist American help after publicly declining it.

In a related development yesterday, British Prime Minister Margaret Thatcher informed Mr. Reagan that the Soviets have asked her if the United States remains open to a U.S.-Soviet summit this year.

It was the first official message the United States has received on the summit since the Soviets abruptly canceled a presummit planning session in protest of the U.S. air strike on Libya last month.

U.S. officials denied that they had been "Soviet-bashing" in the wake of the accident.

But, they agreed, the secrecy surrounding Chernobyl illustrates the Soviet Union's closed society, and points up the need for verification provisions in any U.S.-Soviet arms control pact.

"This teaches us quite a lesson that we have to be able to verify whatever it is that we agree to with the Soviets," Mr. Regan said.

Mr. Shultz compared the openness of Poland, which has issued health warnings about radioactive fallout from the accident, to the silence of Soviet officials.

"Poland has kept people informed of all the information they have had," Mr. Shultz said. "It is an interesting fact that they have reacted in a different way."

Mr. Speakes said a united allied position on the Chernobyl incident could galvanize world opinion against Soviet secrecy about future nuclear accidents.

The far-reaching atmospheric effects of Chernobyl were detected early yesterday in central Japan, where rainfall contained higher than normal levels of iodine.

The Japanese government called a Cabinet-level meeting to discuss the matter, which experts said posed no serious health hazard, and residents in the area west of Tokyo were warned not to drink rainwater and to wash vegetables before eating them.

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ON PAGE   A  NEW YORK TIMES  
4 May 1986

# U.S. Panel Calls the Disaster In Ukraine the Worst Ever

WASHINGTON, May 3— Federal officials said today that the latest information they had received on the Soviet reactor accident confirmed that it was the worst such accident in history but left many critical questions unanswered.

After Federal task force reviewed the latest data at a two-hour meeting this morning, Lee M. Thomas, head of the group, said that "not a lot of new conclusions" could be drawn about the accident and its consequences.

But Mr. Thomas added that American estimates that highly lethal radiation must have drenched an area several miles around the stricken reactor appear to have been confirmed by a Soviet official interviewed on West German television Friday.

## Area Still Radioactive

That official, Boris N. Yeltsin, the Moscow Communist Party leader, said that water reservoirs near the crippled reactor were contaminated and that the region around the reactor was too dangerously radioactive to allow evacuated people to return.

Mr. Yeltsin said radioactivity in the area around Chernobyl had fallen considerably since the disaster but that it was still around 200 roentgen. A roentgen is a measure of radioactivity more commonly referred to as a rem in the United States.

His statement is highly ambiguous, however.

People who, within a few days, are exposed to 200 rem would experience acute illness, suffering from severe nausea or from bone marrow damage and infection. At a 200-rem level, a few people die; at 450, half of the exposed population dies within 60 days; at 600, nearly all die within 30 days.

If the 200-rem figure cited by Mr. Yeltsin referred to an hourly dose, the standard way of stating such figures, then virtually all those exposed for three hours, for example, can be expected to die within 30 days, having received the 600-rem level. If he meant they were exposed to a 200-rem total over a few days, say, before evacuation, then only a few deaths would occur.

Mr. Thomas said his task force was trying to get a full transcript of the official's remarks because they "confirmed what our own experts have been telling us."

"We have consistently said that it's

By PHILIP M. BOFFEY

the worst nuclear facility accident in history, with extensive contamination both on the site and in surrounding areas," he said. "This confirms it all."

## Other Reactors Appear Safe

Mr. Thomas said that, based on the data reviewed today, on which he declined to give details, "we would be more firm in our conclusion that there is no problem with the other three reactors" at the Chernobyl site.

Although some nuclear experts and intelligence officials have suggested that Unit 3 at Chernobyl, which is next to the stricken Unit 4 reactor, was affected by a meltdown or fire that would intensify the accident, Mr. Thomas said, "We would say today that we see no problems with the other units."

Although he declined to say what evidence enabled him to make that assertion, the task force includes representatives of the Central Intelligence Agency, who provide classified information from satellites and other sources.

Both Mr. Thomas, and another member of the task force, Harold Denton,

the top nuclear reactor official for the Nuclear Regulatory Commission, stressed that there was still very little information available on most aspects of the accident.

It has been at least one full week since the Soviet reactor accident, but the most critical questions bearing on reactor safety and public health remain largely unanswered.

Western experts still have no idea what caused the accident, precisely how it progressed, what relevance it has for the United States, what health damage is likely, what threat the accident poses to neighboring countries, or what impact it will have on Soviet agriculture, electric power supplies and the economy.

## Probably Worst Incident Ever

Experts do know that the accident is almost certainly the worst in the history of nuclear power in several respects. This can be said primarily because it released more radioactive material than any previous accident, thereby contaminating a great area and potentially affecting the largest number of countries with radioactive fallout, and also because it seems to have caused more damage to the power

plant than any other similar incident.

But the details of the accident available in the West remain fuzzy and sparse, pieced together from a few terse Soviet statements and a lot of deductions made by Western experts on the basis of fallout measurements made hundreds of miles from the scene supplemented by satellite photographs and expert knowledge of how reactors work.

"There is a large range of uncertainty," said Mr. Denton.

The accident is known, from Soviet statements and satellite photographs, to have occurred in the newest reactor in a complex of four operational nuclear power plants at Chernobyl. Although there has been some speculation that the reactor, which started operating in 1983, was used to produce plutonium for the Soviet nuclear weapons program, Federal officials believe that is not the case.

Any reactor can be used to produce weapon-grade material or to generate electricity, but the best operating configuration varies depending on the purpose. "The documentation we have on the Soviet reactor is that it's a true power producer reactor, optimized for power production, rather than materials production," Mr. Denton told the House Energy and Commerce Committee on Thursday.

"My understanding is that it's an electrical generating plant," Robert Sims, the top Pentagon spokesman, said on Tuesday.

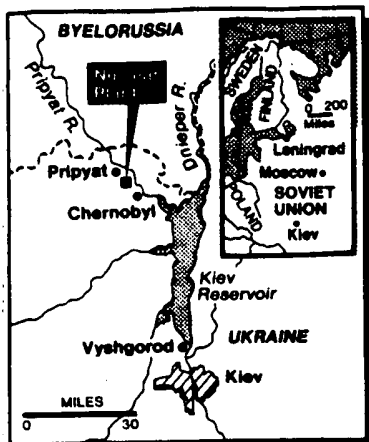
## Day of Accident Unknown

Exactly when the accident occurred is uncertain. Soviet officials have said it began April 26, while some American intelligence officials have suggested it occurred on Friday. The American task force, using meteorological records, has noted when fallout was first detected in Sweden, some 800 miles from the stricken reactor, and has calculated how long the fallout must have traveled to get there.

The best American guess is that the main release of radioactive material started early Saturday, but some task force members hedge and say Friday or Saturday. Lester Machta, director of the air resources laboratory of the National Oceanic and Atmospheric Administration, a member of the task force, said he thinks the radioactive release started around midnight Friday.

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The New York Times / May 4, 1986

**STRICKEN AREA:** Three senior Soviet officials were reported to have visited the area around the Chernobyl nuclear plant.

The most important question, from the standpoint of assuring the safety of reactors, is the cause of the accident. Mr. Yeltsin, the Communist Party chief, who is also a nonvoting member of the Politburo, said in his television interview with the West German network ARD that human error was to blame. Whether that is the primary or only cause is unknown.

Western experts note that in any complicated technological accident, whether failure of a nuclear plant or of a space shuttle, it is often impossible to determine the true cause until after a thorough investigation, and sometimes not even then.

#### One Plausible Theory

Nor is it certain how the accident proceeded. Mr. Denton, the top expert on such matters for the American task force, has suggested one plausible outline of events, in which the reactor lost its coolant, the nuclear fuel overheated and both the fuel and the "cladding" in which it was encased melted, producing chemical reactions that led to "a violent explosion" that ruptured all protective systems and the building itself.

Mr. Denton said he believed that the sequence of reactions also ignited a fire in the graphite used in the Russian

plant to facilitate the nuclear reaction, thereby starting a blaze that continued to release radioactive materials.

But others have suggested other possible sequences, and Mr. Denton acknowledged today that "we really don't know the sequence." "We have no direct evidence," he said. "You could probably get 50 different scenarios that would lead to the same end point."

Mr. Denton said he was convinced that the Soviet reactor suffered a "meltdown" or "partial meltdown" in which the fuel and its cladding overheated and became molten. He also said he was convinced by all the evidence he had seen that there was both an explosion and a fire, although the latter has not been officially confirmed by the Russians.

Mr. Denton would not be more specific, but satellite photographs have shown that the roof of the reactor building had been largely blown off, and other photographs, some shown to members of Congress at a classified briefing, are said to show smoke coming out of the building.

Mr. Thomas said today that it appeared plausible from the latest data that the reactor continued to smolder, although that cannot be confirmed unequivocally. Mr. Yeltsin said that helicopters had dropped lead, sand and boron onto the plant to suppress the radiation from the accident.

#### Lessons Remain Unknown

Without knowing exactly what went wrong in the Soviet reactor, most experts agree, it is impossible to know whether the accident holds any lessons for the United States. The Soviet reactors differ greatly from most American power reactors, chiefly in the graphite, or carbon-like core, which can burn, and in lacking effective containment structures designed to bottle up radioactive gases in an accident. But if the accident was triggered by some reactor element that is found in American plants, or by an operator error that could occur anywhere, then the disaster at Chernobyl might well be relevant to other nations, experts say.

The health damage caused, or likely to be caused, by the accident also remains uncertain. The Soviet Government reported that only two people had died in the accident, that 18 are seriously injured, and that 197 in all have been at least briefly hospitalized. Al-

though some Western press reports have suggested that the death toll might already exceed 2,000, Federal officials say there is no evidence to support those figures, and no evidence to contradict the Soviet figures.

At a news conference Friday, task force members estimated that lethal radiation might spread up to three miles from the site and doses that could cause severe health damage might have reached seven miles. But Mr. Denton said the task force did not know how many people lived or worked that close to the plant, how much warning they had, and how effective any evacuation procedures might have been. "It is just far too tentative, I think, for us to try to draw conclusions on how many people were injured or killed as a result of this accident," he said.

The health effects of radiation are often delayed, Mr. Denton said, and even many of those exposed to high doses may not die for a month or even longer.

Frank Young, the Federal Food and Drug Commissioner, said, "The vast majority of the serious reactions are in a very local area." He suggested that the radioactive fallout would have no significant health effect on the United States or Western Europe. Other health experts have suggested that residents of Sweden, where the fallout was first detected, are also not seriously threatened. The greatest uncertainty, most experts say, is Eastern Europe, where both Poland and Rumania have taken major steps to protect their population against fallout. But task force members say there is such conflicting information coming out of Eastern Europe that they cannot make a sound assessment about the level of danger.

At a news conference Friday, three experts from the American College of Nuclear Physicians warned against overreacting to the feared danger of fallout. Richard Reba, director of nuclear medicine at George Washington University medical center here, said that if he were invited to go to Kiev, 70 miles south of the reactor site, he would not only go, but would ask for a ticket for his wife, as well.

Oscar B. Hunter Jr., a pathologist who works on radiation, said he doubts that "anyone outside of a mile" of the site "would be exposed to any lethal type of radiation."

2 May 1986

U.S. SATELLITES COULD MONITOR SOVIET DISASTER

BY RICHARD C. GROSS

WASHINGTON

U.S. intelligence agencies depend chiefly on four types of satellites to collect data about the Soviet Union, which could have monitored the Chernobyl disaster, defense analysts say.

Despite the presence of the satellites, however, government spokesmen said Washington first learned of the Soviet nuclear accident April 25 from an announcement by the Soviet news agency Tass Monday.

All four satellites could return information to the United States about the explosion, fire, and meltdown at the Chernobyl nuclear reactor, the defense analysts said Thursday.

Officials at the intelligence agencies refuse to discuss the operation or function of their satellites or the interpretation of data collected. The hardware for intelligence collection is referred to publicly only as "national technical means."

A primary source of information for U.S. intelligence is the KH-11 photo reconnaissance satellite, a 30,000-pound vehicle with a \$500 million price tag that passes over the Soviet Union in a polar orbit twice a day. KH aptly stands for "keyhole."

Its high resolution photographs are transmitted electronically to ground stations, unlike early photo reconnaissance satellites that ejected packages of material through the atmosphere to waiting planes that snared them with nets.

Cloudy skies over Chernobyl have prevented the satellite from snapping clear pictures of the disaster, sources said.

But detection instruments aboard other types of satellites see through clouds. Those vehicles, all of which routinely pass over the Soviet Union, are:

-The Defense Meteorological Satellite Program, or DMSP. Those satellites essentially are weather orbiters with additional classified functions.

They are in polar orbits and their infrared sensors look for heat sources and are designed to detect nuclear explosions and take temperature readings of the atmosphere.

-The NUDET Detection System, or NDS, which are concealed in NAVSTAR navigation satellites in 17,600-mile-high orbits inclined 55 degrees to the equator. NUDET, which stands for nuclear detonation, detects radiation emissions.

-Defense Support Program, or DSP. The primary function of these satellites, which use infrared sensors, are to detect the launch of missiles by picking up their fiery exhaust trails. Advanced DSP satellites will have the capability to sense radiation, the defense experts said.

Intelligence agencies -- the CIA, the Pentagon's Defense Intelligence Agency and the National Security Agency -- supplement information from these satellites with photographs and infrared data gathered by commercial satellites such as Landsat.

"The commercial satellites are supportive," said a defense analyst, who spoke on condition he not be identified. "Landsat is used to double-check information and the extra data can help resolve anomalies."

But the intelligence agencies do their own interpretations and analyses of photographs and other data in what is called net assessment. The data generally are reliable, the analyst said.



ARTICLE APPEARS  
ON PAGE 2-2WASHINGTON TIMES  
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# Meltdown latest on list of disasters

By Warren Strobel  
THE WASHINGTON TIMES

The nuclear catastrophe at a Ukrainian power station is only the latest in a staggeringly long line of Soviet disasters, both civilian and military, that observers say are symptomatic of a system that puts production quotas and prestige before individual safety.

"Wherever you look ... whatever health standards are necessary ... are being ignored," said Petr Beckmann, a Czech-born expert on Soviet bloc engineering.

"They have good hardware, but it's done without too much consideration for the safety of the individual," said Ernest Weatherall, a retired journalist familiar with Soviet programs.

"Life is much dearer here," he said.

The apparent lack of a steel-and-concrete structure around the reactor core exacerbated the disaster at the Chernobyl nuclear power plant, which last week underwent a meltdown that may have killed thousands and still is releasing radiation. Such containment structures are required at commercial power plants in the United States.

"The reason they don't have a containment building is because it's cheaper to make Russians than containment buildings," Mr. Beckmann said.

Both men said the kind of safety slips that evidently exacerbated the Chernobyl disaster have led to a wide array of fatal mishaps over the last 30 years, from the release of deadly microorganisms to the sinking of nuclear submarines and the

accidental detonation of a massive ammunition depot.

The accidents occurred despite — on paper — rigorous safety standards, Mr. Beckmann said.

He said, "They always have window-dressing." But standards in the Soviet bloc fall by the wayside when workers must choose between

***"They [the workers]  
are between a rock  
and a soft place."***

enforcing safety measures against the unlikely event of an accident and fulfilling production quotas.

"They [the workers] are between a rock and a soft place," Mr. Beckmann said. "They always give way to the more probable thing."

Although accidents, major or minor, rarely make their way into the Soviet state-controlled media, reports of catastrophes have reached the West, often months or years after they occurred. They include:

- In late 1957 or early 1958, a chemical explosion tore through a nuclear waste dump in Chelyabinsk province on the eastern side of the Ural Mountains, killing an undetermined number of people and leaving as much as 400 square miles of land uninhabitable.

The accident, which was brought to light by an exiled Soviet scientist in 1976, probably occurred because of sloppy storage of the nuclear waste, allowing water to seep into the dump and, once heated by the radioactive materials, turn into the steam which caused the explosion.

- In 1960, many of the Soviet Union's top-ranked space scientists were killed when a moon-bound rocket, its liftoff timed to coincide with a visit to the United Nations by then-Soviet leader Nikita Khrushchev, exploded on the rocket pad.

After one of the rocket's boosters had failed to ignite, project commander Marshal Mitrofan Nedelin put safety precautions aside in hopes of saving the timing with Mr. Khrushchev's visit. He inspected the troublesome booster himself, but it ignited and the rocket, held to earth by ladders, toppled over.

The incident was not revealed until 1976.

- In April 1979, a biological weapons research plant near the city of Sverdlovsk accidentally released deadly anthrax germs, which cause disease in cattle and are transmissible to man.

Although the cause of the accident is unknown, a 1985 classified report detailing Soviet violations of arms control treaties stated, "The number of deaths reported ranges between 40 and 3,000, with the best estimates in the 200 to 1,000 range."

The report noted that the victims' symptoms were "inconsistent with an anthrax outbreak spread through dissemination of tainted meat — the official explanation given by the Soviets."

- In May 1984, a naval ammunition depot at Severomorsk, 900 miles north of Moscow, exploded with such ferocity that intelligence analysts first believed it was a nuclear blast. As much as one-third of the Northern Fleet's surface-to-air missiles were reported destroyed and 200 people killed.

U.S. officials blamed the accident, which was revealed in June 1984, on the Soviets' careless storage of the weapons.

"That was just sheer carelessness," Mr. Weatherall said, adding, "They don't have any lawsuits in the Soviet Union."

WASHINGTON POST  
14 May 1986APPEARED  
ON PAGE E-21

JACK ANDERSON and DALE VAN ATTA

## Nuclear Mishaps Haunt Soviets

**T**he Soviet government's appallingly cavalier attitude toward the dangers of nuclear power came as no surprise to us. Two years ago this month, when we reported secret details of earlier Soviet nuclear accidents, the Soviet Embassy here responded with a smart-aleck letter ridiculing our revelations.

The wisecracks of the embassy information officer, Eugene Zykov, must have turned to ashes in his mouth since the nuclear disaster at Chernobyl last month. His letter's tone of sarcasm and braggadocio was inappropriate in light of what now is confirmed about the Soviets' failure to build and maintain nuclear reactors with a rudimentary concern for safety.

One grim disclosure we made two years ago, citing secret and top secret CIA reports, was that many hairless sailors were in Soviet veterans' homes, suggesting overexposure to radiation leaking from faulty nuclear submarine reactors.

This evidently tickled the embassy flack's funny bone. Our story on the "radioactive nightmare" in the Soviet Union, he wrote, "could cause even those 'hairless sailors' . . . to have their hair stand on end."

Zykov continued: "Being too engrossed in his macabre narration, the author failed to mention one more point. No organizations such as 'National Campaign for Radioactive Waste Energy,' 'Supporters of Silkwood' or 'Musicians United for Safe Energy' exist in the USSR . . . They do not exist because we have not had the same problem [as] the nuclear power industry in the U.S."

We suggest that other reasons may explain why antinuclear protest groups do not exist in the

Soviet Union. Ask Andrei Sakharov or the hapless monitors of the Helsinki Accords how the KGB treats outspoken critics of the Soviet regime.

The embassy letter claimed that all Soviet nuclear power stations must have "at least three or four fail-safe systems for protection against radioactivity," and that about half the construction costs go into the protection systems. The letter then lists three government agencies responsible for "overseeing the strictly required safety measures," and added: "That's why it stands to reason that Soviet experience in nuclear power engineering wins recognition among many prominent foreign experts."

The embassy letter then descends to a flat-out lie, stating that "within the last 30 years, the prestige of the Soviet stations has never been undermined by tragic accidents like the one which occurred at Three Mile Island in May 1979."

In fact, the Soviets had two serious reactor shutdowns in the early 1980s, and a near-holocaust in 1957, when carelessly stored nuclear wastes exploded at a plant near Chelyabinsk, rendering hundreds of square miles uninhabitable to this day.

Comrade Zykov stated that people living within two to three miles of Soviet nuclear plants get an annual dose of radiation equivalent to "a few hours on the coast of Miami Beach."

He added: "That is why the USSR plans to construct more stations close to major industrial cities in the European part of the country, to provide heat and energy."

The frightening thing is that the Soviet leaders may do just that.

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WASHINGTON POST  
2 May 1986

# Reagan Angered by Soviet Delay

## Moscow Rejects U.S. Aid Offer

By David Hoffman  
Washington Post Foreign Service

NUSA DUA, Indonesia, May 2 (Friday)—President Reagan and his top advisers have grown increasingly angry over Soviet delays in providing details to the world about the nuclear accident at Chernobyl, according to senior White House officials.

Reflecting this annoyance, Secretary of State George P. Shultz said at a press conference here yesterday that the United States already has "a much fuller picture than what the Soviets are presenting to us or, for that matter, to their own people."

At the same time, Shultz said the Soviets had firmly rejected offers of technical and medical help from the United States to cope with what Shultz called a disaster. The Soviets responded that they are "adequately equipped" to handle it, he said.

Reagan's first reaction to the nuclear accident, once it became known publicly on Monday, was to express concern and refrain from criticizing the Soviets. Late last night, before a dinner here with Indonesian President Suharto, Reagan answered, "no" when asked by reporters if he was annoyed at the Soviets.

But the White House officials said the president and other top advisers have privately become highly critical of the way Moscow is handling the accident.

"We took the high road initially," said a senior White House official who was part of the discussions. "We didn't see any purpose in zapping them." But when the Soviets refused to provide more details, the attitude quickly changed, he said.

"The Europeans are incensed, and we are, too," the official said.

Reagan and his advisers have grappled with the Soviet nuclear accident in the relative isolation of this tropical resort 11,400 miles from Washington. In between meetings with Southeast Asian foreign ministers and Suharto, Reagan was asking aides why the Soviets "didn't tell us sooner and tell us more," one official said.

Reagan and Shultz yesterday began to criticize the Soviets openly for delaying announcement of the accident for three days and for failing to disclose more information about it to the world once radiation was released into the atmosphere.

"Well, they're usually a little close-mouthed about these things and this is no exception," Reagan told reporters here as he opened a meeting yesterday with Suharto.

Presidential spokesman Larry Speakes said the Soviet authorities are keeping a "close hold" on information about the accident. He and Shultz repeatedly accused the Soviets of neglecting their responsibility to tell neighboring countries about the dangers posed by the release of radiation into the atmosphere.

"We're turning up the heat," said the White House official.

Speakes said the accident began Friday in one of the power block rooms at the Chernobyl reactor, but the United States did not learn of it until Monday from a report by the Soviet news agency Tass. Reagan was then flying here from Hawaii for the foreign ministers meeting. He leaves today for Tokyo and the seven-nation economic summit.

Shultz said information obtained by the United States, including satellite photographs, indicates that the Soviets have understated the loss of life resulting from the accident.

"Our own pictures give us information that suggests the casualty rates are higher than those that have been announced by the Soviet Union, so far by a good measure," he said.

"The fact is, from our own sources we know more than the Soviet Union has told us or other countries," Shultz said.

White House officials said Reagan's growing anger at Soviet delays in providing information about the accident was in part out of concern for the possible hazards of the spreading radiation. But the officials also said Reagan believed the Soviets had demonstrated what he has described as the failings of a closed society.

"It's a great contrast to the way information emerges on something of that kind, let's say, in the United States as compared with the Soviet Union," Shultz said, "because there would be a tremendous volume of information available if that accident had taken place" in the United States.

The Soviet rejection of two earlier U.S. offers to help with the accident came at a State Department meeting between Soviet charge d'affaires Oleg M. Sokolov and Deputy Assistant Secretary of State Mark Palmer, officials said.

A HIGHLIGHT  
ON PAGE 1-4WASHINGTON TIMES  
2 May 1986

# Soviet official on Hill: 'Problem not yet over'

## Wet sand reported dumped on plant

By Roger Fontaine  
THE WASHINGTON TIMES

The Soviet Union maintained it had control of the reactor fire at Chernobyl yesterday, but U.S. official sources stressed the lack of "conclusive evidence" on what was happening at the site.

Moscow issued the latest in a series of official statements, the fourth since the situation became public, claiming that radiation at the plant had dropped sharply. And one of its diplomats in Washington in unprecedented testimony before Congress, said radiation from the nuclear plant disaster was decreasing, but other countries should not relax because the "accident is not over."

Intelligence sources here — unsure as to whether the fire is out or still burning — said Soviet planes "are dumping" what is believed to be earth or sand on the stricken reactor.

But some scientists doubted that technique would work.

A congressional source said that the Soviets may be dumping "wet sand" on the fire, a technique the British recommended. Great Britain experienced a much smaller graphite fire at its Windscale military reactor in 1957.

The American interagency task force investigating the incident stressed the absence of concrete information, but said the Soviet claim that the fire is smothered

was plausible. However, the group said "it is not clear whether the fire is out or not" and it cannot confirm reports of "damage at the second reactor."

Lee Thomas, head of the Environmental Protection Agency and chairman of the task force, told a news briefing that the United States does not know the number of casualties or the extent of the crop and environmental damage that may have occurred.

Harold Denton of the Nuclear Regulatory Commission, referring to the initial release of radioactivity, said it "was so massive that there is very little [left] to be released."

Official information one week after the trouble in Chernobyl began, however, remains scanty on developments at the site, as Soviet officials say little and U.S. intelligence remains apparently thin. Officials here give the impression of relying primarily on news accounts.

"There's not that much information there," said one State Department official.

Half of Europe was at the mercy of the weather yesterday as southerly winds pushed radiation from the Soviet nuclear power plant toward Eastern Europe and the Alps, Swedish meteorologists said.

Meteorologists predict a radioactive cloud will cover half of Europe — Italy, Switzerland, Austria, Hungary, Romania, Bulgaria, Yugoslavia, Greece and Albania, and parts of West Germany and Czechoslovakia — in the next two days.

The U.S. Agriculture Department said shifting winds were carrying a radioactive plume from the stricken plant over the rich farmland of the western Ukraine. Norton D. Strommen, chief meteorologist of the U.S. Agriculture Department's World Agricultural Outlook Board, said in Washington that the new wind pattern appeared likely to remain stable for at least 24 to 48 hours.

That meant there was a potential for fallout in the western Ukraine and the other countries affected, he said, but the possible extent remained unclear.

"At this point, it's very difficult to pinpoint a percentage, but we can

indicate this is the western end of some of the prime winter grain areas. It does include some of their best areas" in terms of yield, Mr. Strommen said.

All the department's information sources, including satellite surveillance, indicated that the flow of radiation from the Chernobyl plant continued yesterday and had not been contained, he said.

Radiation levels from the nuclear reactor fire dropped in Scandinavia yesterday, and Swedish officials said that even pregnant women should not worry about radiation danger.

But radiation has led to higher levels of radiation in milk, which the authorities will monitor, said Gunnar Bengtsson, head of Sweden's National Radiation Protection Institute.

In Copenhagen, the World Health Organization said representatives from the Soviet Union and West European countries had been invited to meet next week in the Danish capital

to work out recommendations on how countries should deal with the fallout.

The cause of the accident has not been revealed, but Soviet radiation expert Pavel Ramzaev said in Mos-

cow when asked yesterday if it was a meltdown of the reactor core: "I suppose that is so."

In Stockholm, Gunnar Bentsson of Sweden's National Radiation Protection Institute said the International Atomic Energy Agency in Vienna told him the Soviets had notified it the fire was out.

The agency's chief spokesman said, however, that he could not confirm the fire had been extinguished. "We have never been informed officially that there was a fire," Hans-Friedrich Meyer said.

A picture made by a Swedish-French satellite showed yesterday that the fire at the Soviet Union's Chernobyl nuclear power plant had decreased, analysts said. Some said it may be out.

"We cannot see the smoke which we saw Wednesday," said Lars Bjerkesjo of Satellitbild, the company which received the picture at a land station in northern Sweden. "It appears the fire has decreased," he told the Swedish news agency Tidningar-nas Telegrambyraa.

"We can see the structure of the reactor a lot more clearly, and the picture confirms our earlier conclu-

sions that about one-fourth of the building is damaged," he said.

"It's difficult to be 100 percent sure if the fire is extinguished," said Christer Larsson, head of Space Media Network, an agency handling rights to the photo. "It's probably still very hot there, several thousand degrees. It's difficult to say something definite on this."

While Soviet leader Mikhail Gorbachev attended the traditional May Day parade in Moscow without making a public comment about the accident, Soviet spokesmen steadfastly denied that anything was seriously wrong.

Vladimir Lomeiko, the top Soviet Foreign Ministry spokesman, said yesterday that the accident was under control at the Chernobyl site and that the water there is safe for drinking.

Continued

"Right now there is a campaign in the West that does not want to acknowledge the data the Soviet government is providing," he said. "Who needs to create ... an image of the lying Russians?"

"Why is there no trust in the data which has been released by the Soviet government?" asked Mr. Lomeiko, speaking through interpreters on "ABC Good Morning America."

Mr. Lomeiko repeated earlier Soviet announcements of two dead and 197 hospitalized.

"Forty-nine were released after treatment," he said.

An Israeli amateur radio operator in Tel Aviv said a Soviet ham radio operator told him there were 300 casualties, but how many were dead was not clear.

David Ben-Bassat said the Soviet ham operator told him Wednesday that he lived 30 miles north of the reactor and, "Nobody drinks the water. We are afraid."

Four formal government statements have been published so far, the sum total of Soviet press coverage to date. But official statements have not given any details on the accident nor have they explained how it happened or how much radiation was released or how the dead and hurt were injured.

*This story is based in part on wire service reports.*

ARTICLE APPEARED  
ON PAGE A 1NEW YORK TIMES  
2 May 1986

# U. S. Says Intelligence Units Did Not Detect the Accident

By **STEPHEN ENGELBERG**

Special to The New York Times

WASHINGTON, May 1 — American intelligence agencies, despite their ability to take satellite photographs and intercept communications, learned of the accident at the Chernobyl nuclear plant only from a Soviet announcement, according to Reagan Administration spokesmen.

An intelligence source said there were indications of unusual activity in the Kiev area by Sunday, but it was not clear what was happening.

Robert Sims, the Pentagon spokesman, said the United States had learned of the incident from the first Soviet Government statement Monday and had not withheld any prior information. He said "the intelligence work on our part has been excellent."

Any possible delay in identifying the nature of the problem can be attributed to several factors, according to intelligence experts.

One way to detect the accident, which involved an explosion and partial destruction of the reactor building, would have been through satellite photos. But the United States has only one KH-11 aloft. This is the military surveillance satellite that takes photographs of the Soviet Union.

The secret military satellite photographs, in contrast to the images publicly available from the American civilian satellites of the Landsat series, can show detail of striking clarity, including trees and small vehicles.

Officials said military satellites would not routinely take photographs of the Chernobyl nuclear plant, which is a civilian utility not involved in nuclear weapons manufacture.

"You would not expect a power plant to be a priority target," said Jeffrey Richelson, a professor at American University who has studied surveillance satellites. "You would photograph it once every couple of years and you would not go back. On a day-to-day

basis, who cares about power plants?"

Senator Malcolm Wallop, a Wyoming Republican and a former member of the Senate Select Committee on Intelligence, said military satellite tended to focus on military targets, particularly those related to arms treaties.

He said failure to detect the nuclear accident sooner underscored the need for more spies to collect intelligence within the Soviet Union.

Another means of detecting the Chernobyl accident when it occurred could have been through interception of communications at American listening posts ringing the Soviet Union.

Officials familiar with the procedures said that the National Security Agency, which is charged with this activity, recorded and stored the recordings for later translation and analysis. Any intercepted communications regarding the nuclear accident would not have been given immediate attention without a specific reason for doing so, the experts said.

One possible clue to what was happening in Chernobyl would have been a sudden increase in the volume of communications traffic. Professor Richelson said the presence of several military headquarters in Kiev suggests that the Americans would be observing communications in this area for any unusual upsurge.

Administration officials said that once it was clear that there had been an accident, intelligence analysts were able to go back through the material gathered from various sources to piece together a chronology.

They said the accident began on Friday, followed by the first release of radioactive material to the atmosphere on Saturday just after midnight.

It was not announced until Monday, after monitors in Sweden detected rising amounts of radioactivity.

ARTICLE REPRODUCED  
ON PAGE ATWASHINGTON POST  
2 May 1986

# U.S. Believes Meltdown Extensive

By Fred Hiatt and Philip J. Hiltz  
Washington Post Staff Writers

U.S. officials now appear certain that the Chernobyl nuclear power plant experienced an extensive core meltdown. They also said they believe the nuclear accident was confined to a single reactor and that the fire at the site in the Ukraine may have been extinguished.

But a Soviet Embassy official, in an extraordinary appearance before a congressional committee here, made clear that the Soviets' problems are not over. The problem at Chernobyl, he testified, "has not been liquidated yet."

Some Reagan administration officials appeared to back away from earlier statements that hundreds of people may have been killed in the nuclear power plant accident. Immediate casualties were probably confined to those working at the plant, and many in the normal work force of 250 were probably evacuated from the site before the cat-

astrophic explosion and fire, some officials now believe.

But the officials stressed that they still do not know the level of radiation around the plant and so cannot predict how many people will suffer long-term health damage. One official said that satellite photographs show tourist boats plying the river near the plant and soccer games within a few miles of it.

The Reagan administration also stressed its frustration with Soviet unwillingness to provide more information about the accident. Officials said they remain largely in the dark about its severity, levels of radioactivity in the area and the number of casualties.

But scientists at the Lawrence Livermore National Laboratory in California, in the most reliable calculations to date, confirmed yesterday that there had been an extensive meltdown. "The core is gone," one Livermore official said. The calculations were based on an analysis of emissions at the plant.

The nuclear accident, described as the worst ever, apparently began last Friday, but the Soviet Union did not announce it until Sweden detected abnormal levels of airborne radioactivity on Monday.

An administration task force headed by Lee M. Thomas, administrator of the Environmental Protection Agency, said that increased monitoring in the United States and Canada shows no abnormal levels of airborne radioactivity. The air mass containing radioactivity released during the initial accident late last week "is now widely dispersed throughout northern Europe and polar regions" and has reached the western coast of Norway, the task force reported.

U.S. officials continued to say that they do not believe the accident at the Chernobyl plant, 60 miles north of Kiev, will send dangerous levels of radioactivity over this country.

"Based on the latest information, there is no reason to believe that levels reaching this country pose any threat to the health and safety of citizens of the United States," Sheldon Myers, acting director of EPA's office of radiation programs, said. "It is very unlikely that significant amounts will reach the United States."

The testimony of Vitaliy Churkin, a second secretary of the Soviet Embassy here, was given at a hearing of the House energy, conservation and power subcommittee. During frequently testy exchanges with members of the subcommittee, Churkin would not say whether the fire has been extinguished, but appeared to indicate that it continues to burn.

"The problem is getting better. It is not out of hand. It is improving," Churkin said. "But unfortunately, it is not over yet."

Churkin, saying the Soviets have been "very forthcoming," bristled at suggestions that his government misled the world about the severity of the accident and misled its own population about the danger of radiation. He said two people were killed in the accident and 197 injured, 18 of them seriously.

"It was a horrible tragedy," he said. "All those who suffered and are suffering will be taken care of."

One knowledgeable U.S. official said the Soviet casualty figures are now thought possibly to be correct, although the administration continues to harbor considerable skepticism. Shortly after the world learned of the accident, U.S. Arms Control and Disarmament Agency Director Kenneth L. Adelman said the Soviet casualty figures were "preposterous" and State Department spokesman Charles E. Redman said that hundreds of deaths were possible.

One Defense Department official said that U.S. officials have no good evidence to contradict the Soviet statements but neither can they confirm them.

Staff writers Michael Weisskopf, Cass Peterson, Cristine Russell and John M. Gashko contributed to this report.

"Our intelligence is as good as it can be without any cooperation from the Soviets," the Pentagon official said.

Officials said they believe that radiation levels in the Chernobyl area, given the severity of the fire and blast, must be high enough to warrant a greater evacuation than the Soviets appear to have ordered.

"Either there's nothing seriously wrong, which we don't believe, or there's something very seriously wrong, but to carry out their lie they're willing to go to the extent of hazarding the lives of people around the plant," the Pentagon official added.

But Churkin told the House subcommittee that all those affected "were well aware of what has happened."

"They won't even have to pay medical bills," he added.

Intelligence experts here also remain divided about whether the fire in the reactor is still burning. The question is important because the amounts of radioactivity released into the atmosphere may diminish once the fire is out.

Officials said that Soviet helicopters were actively fighting the fire Wednesday, dumping sand, chemicals or some other substance on the reactor. Experts said that as long as the levels of radioactivity were low enough to permit helicopters to hover nearby, the Soviets could have smothered the fire in the nuclear plant's graphite rods.

But Les Williams of Boots and Coots, a private fire-fighting firm in Houston, pointed out that it would be very difficult to determine from the air whether the graphite fire is extinguished.

Graphite, if not contaminated by other materials, burns without smoke, he said. Early in the accident, building materials and other debris including nuclear fuel would have yielded a dark smoke, visible in satellite photography. But later, as the fire became more purely graphite in burning, the smoke would dissipate.

In addition, satellite heat sensors would detect a very hot spot as the graphite slowly cools, even once the fire had stopped.

A second hot spot detected from space Tuesday had prompted speculation that an adjoining reactor had caught fire. But U.S. officials said the second heat source is outside the plant and apparently unrelated to the nuclear accident, speculating that it is a construction facility of some kind.

Thomas of the EPA said U.S. experts "say that it is plausible the fire could be out" but cannot confirm that. Harold R. Denton, a Nuclear Regulatory Commission official, said that even if the fire were extinguished, significant amounts of radioactivity will remain in the area.

"They have a huge problem with regard to cleanup," said Denton.

Technical expertise in decontamination was part of the assistance that President Reagan offered and the Soviets declined, according to Energy Secretary John S. Herrington.

# Civilian Satellites Penetrate Soviet Secrecy, Photograph Plant

## *Space Competition Takes New Direction*

By Nell Henderson  
Washington Post Staff Writer

A new kind of space competition was launched this week as the western world turned to two civilian satellites to penetrate the Soviet cloak of secrecy and produce photographs of the damaged nuclear reactor at Chernobyl.

Unable to obtain aerial photos of the site within the Soviet Union, western news agencies gained their first overhead glimpse of the reactor Tuesday from Landsat, the U.S. government-owned remote sensing satellite that has sold space photos of the Earth since 1972.

Then yesterday a new French satellite produced a more detailed view of the reactor, showing damage to the ground next to the reactor and breaking Landsat's 14-year monopoly on such service.

Computer analysis of the photo, taken from 500 miles above the earth by the French Spot satellite and released in Sweden, showed that smoke had stopped billowing from the reactor and revealed a long dark scorch mark on the ground next to the reactor, said Robert Lees, an image analyst for Spot Image Corp., of Reston, the wholly owned subsidiary of the French company created to market Spot's services.

The mark, at least 600 feet long, is believed to be "the probable result of a blast," Lees said. Damage to the building cannot be discerned from the photo, but it is clear that the smoke visible on the earlier Landsat photo is gone, he said. Lees cautioned, however, that the lack of smoke does not mean the fire at the reactor is out.

The Landsat photo revealed less detail of the plant itself, but covered a larger area and used infrared viewing to show vegetation surrounding the concrete facility.

While feeding an information-hungry world with images of an inaccessible site, the two photos illustrated the strengths and weaknesses of the only two non-military satellites that sell their services to anyone who will pay the price.

Landsat, the old war horse of civilian space photography, provided the first photo. Spot, only launched in February, was slower because the satellite is so new, but provided a level of detail previously available only to the military. Technically not yet open for business, Spot's capabilities have already thrown earthbound news agencies, lawyers and diplomats into a spin over the possibilities of a new era in civilian space-based photography.

The technology is not entirely new—Soviet and U.S. military satellites are said to be capable of reading license plates and newspaper headlines from space. What is new is the detail now available to the public, and the two local companies now competing to sell it.

Since 1972, farmers, oil companies, geologists, foresters, foreign governments and others interested in land resource management have bought satellite photos taken by Landsat. The photos covered broad expanses of the Earth, showing erosion and vegetation patterns, broad coastlines and mountain ranges. The smallest discernible object is 98 by 98 feet.

Spot, by contrast, covers a smaller area, but offers black and white photos of 10 meter resolution, which means an object 33 feet by 33 feet in size, or about half the size of a tennis court, can be identified. The photos show clearly discernible roads, bridges, airlines, piers and ships.

Spot represents a \$300 million investment by the French government. Neither satellite actually takes photographs: Their electronic sensors record energy reflected off the Earth's surface. The data is collected on computer tape that can be used to create a photograph or even by transferred onto a floppy disk.

Spot's prices range from \$155 for a black and white print to \$2,550 for a top-of-the-line computer-compatible tape. Landsat's data is marketed by the Earth Observation Satellite Co. (Eosat), based in

Lanham, a joint venture of Hughes Aircraft Co. and RCA Corp. Eosat's prices vary from \$50 to \$3,300.

Eosat says Landsat has the advantage of being able to record images in a wider range of spectral bands than Spot. Photographs in some infrared bands are able to identify certain minerals that Spot images cannot detect, Eosat President Charles P. Williams said.

Spot, however, has the advantages of being able to view the same site more frequently than Landsat. Both Landsat and Spot circle the globe in near polar orbits. Landsat covers nearly every location on earth in 16 days, while Spot takes 26. But while Landsat's sensors "look" straight down, Spot's mirrors allow the sensors to "look" to either side—thus Landsat can catch a particular site once every 16 days, while Spot can view the same location about twice a week. By viewing a site from two angles, the satellite also can generate a stereoscopic image.

Thus, Landsat, by luck, obtained the first photo of the Chernobyl reactor but will not be able to get another for almost a month, while Spot may obtain another glimpse within a week.

Individuals, companies, U.S. government agencies or anybody else can buy Spot's services from the Reston-based subsidiary, while the rest of the world can turn to the parent company in Toulouse, France. That company, Spot Image S.A., is owned primarily by the French space agency, but also reflects investments by French banks and aerospace concerns, the Belgian and Swedish governments, and the Belgian telecommunications and aerospace industries.

Spot expects most of its business



to come from traditional Landsat users such as farmers monitoring their crops, geologists looking for mineral deposits and energy companies searching for oil and gas. But

the company acknowledges that new uses are possible—that Iraq could buy photos of Iran, while Libya could buy photos of downtown Washington.

If buyers want a photo of President Reagan's ranch, all they have to do is provide the latitude and longitude, said David S. Julian, director of sales and marketing for the U.S. Spot Image subsidiary. "We will acquire an image of any place in the world and make it available to any and all interested parties . . . I plan to open up every market I can."

While opening new windows on the world, the prospect of advanced satellites for hire also stretches space law beyond its current limits. News executives have begun asking whether the First Amendment will float in space if they buy photos of U.S. or Soviet military movements.

Foreign countries have expressed concern about other governments having access to satellite photos of their territories. Others foresee satellites as potential tools for corporate spying.

"It's so new—the constitutional issues are just being raised by the technology," said Robert A. Destro, a member of the U.S. Civil Rights Commission and an expert on constitutional law. "It's going to be tricky, but Spot is going to go a long way toward bringing First Amendment issues into the 21st century."

One of the keys to news agency interest is the prospect of obtaining overhead looks at territory where aerial photography is not allowed. ABC News has used Landsat photos of the Iran-Iraq border, a Libyan military airfield and Soviet naval bases.

"We will have access to the world we wouldn't have otherwise," said Mark Brender, an ABC News editor and chairman of the media in space committee of the Radio-Television News Directors Association (RTNDA). "The time does not appear to be too far distant when privately held satellites and other orbital facilities will be as indispensable as the printing press and the camera to a free society."

News executives and their attorneys already have expressed concern about the possible clash between national security and space-based news gathering.

"At some time the government might start to wonder if [Spot] revealed things they don't want revealed," said Robert Aamoth, a communications attorney representing RTNDA. "To impose restrictions on press use of remote sensing satellites would constitute prior restraint and would have to be justified by de-

monstrating a clear and present danger to national security."

RTNDA also has argued that the 1984 Landsat Act, which began the process of transferring Landsat to the private sector, grants "unbridled discretion" to the government to suspend, revoke or withhold licenses on the basis of national security. "These provisions would be unconstitutional under the First Amendment for being unduly vague and overbroad, for allowing unjustified prior restraints to be imposed on the press, and for chilling constitutionally protected activities without an adequate justification," RTNDA's attorneys wrote the Transportation Department, which currently is developing rules to implement the act.

Spot, however, is owned by the French and therefore is "beyond U.S. jurisdiction," Aamoth said. "There would be no justification for preventing U.S. news agencies from getting pictures that are available to the rest of the world."

CIA Director William Casey, commenting on Spot at a recent meeting of newspaper executives, said the agency does not plan to restrict media use of the satellite: "Oh, I don't think there's anything we can do about it. Anybody can go out and get whatever information they can get, the press and anybody else in any other country. . . . I expect that large news organizations will have one of those satellites themselves one of these days."

Casey added, however, that "the press has a responsibility to listen and consider" the government when it argues that information should be withheld on national security grounds, and noted that such cooperation occurs frequently.

Destro, an assistant law professor at Catholic University, said that foreign governments may prove more difficult than our own, and that the pressure could be indirect. "What if Mikhail Gorbachev calls Ronald Reagan and says, 'Put a lid on ABC or no summit?'"

"If ABC got a U2 to fly over the Soviet Union, it probably would be shot down," Destro said. "Foreign governments might retaliate [against Spot], or might consider shooting down the satellite."

State Department official familiar with remote sensing policy said the agency has no problem with Spot as long as it makes the data available on an open, equal, nondiscriminatory basis. Spot has vowed to stick with this policy, called "open skies," which was adopted by the U.S. government when foreign governments first expressed nervousness about Landsat.

The open skies approach is current U.S. foreign policy, but no international law requires other coun-

tries to follow if they launch remote sensing satellites. Some industry observers have argued that it would make business sense to offer exclusive rights to satellite photos, and news organizations have argued

that they cannot consider investing in the technology unless they can have at least temporary rights to such photos so they can beat their competition.

Developing nations, however, are "not thrilled with open skies," said Ann Florini, a research director for the U.N. Association, a private, nonprofit research organization based in New York. "The big concern is lack of access to information about their own territory. They are worried they won't know what pictures are being taken by whom for what purpose."

Corporations might use Spot photos of their competitors' facilities much as they now use aerial photos, said Leila Kight, president of Washington Researchers Ltd, which investigates companies for other firms. "There is no reason not to use it for learning about competitors or acquisition targets. As soon as the knowledge is made available, there will be companies using it for that purpose."

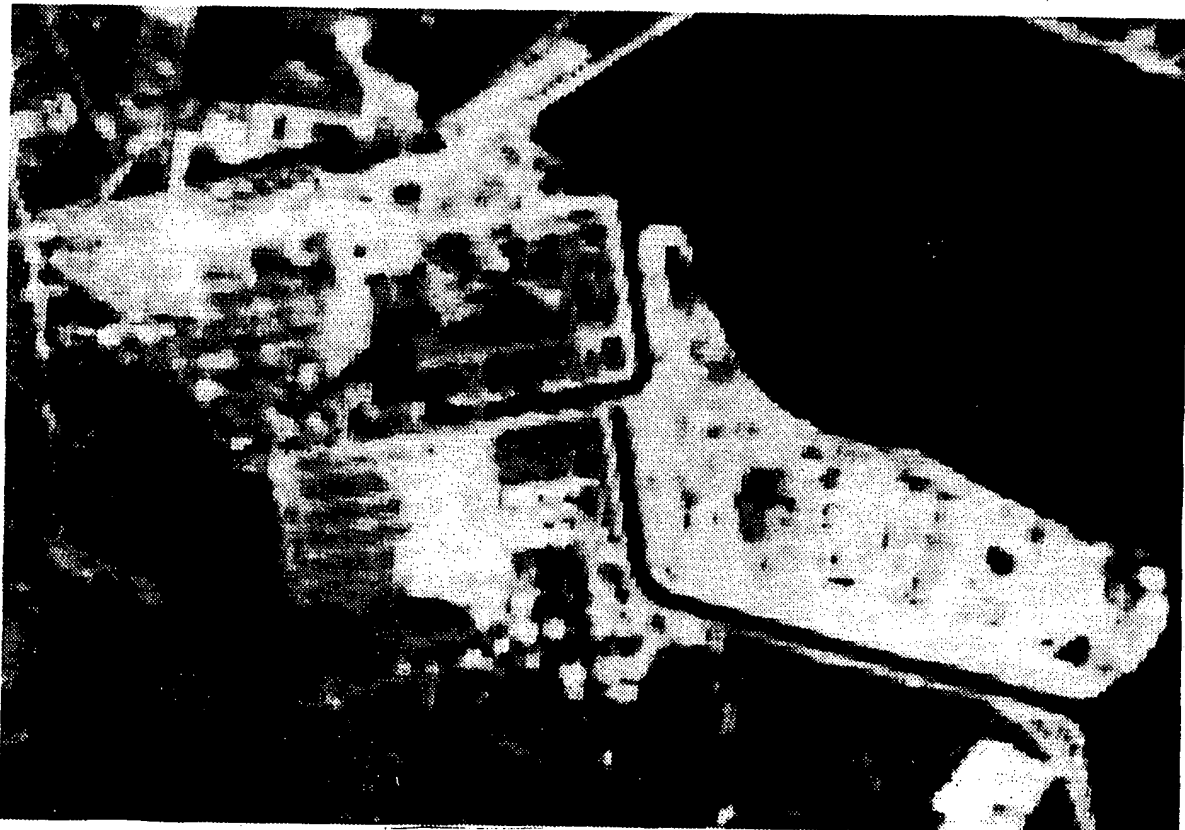
Eosat sees the heavenly competition as a boost for both businesses. Both satellite companies plan to spend millions to educate new customers about the availability and quality of their products.

Spot Image foresees a potential worldwide market of about \$100 million for its services, and expects sales to U.S. customers to generate almost half of total revenue. Eosat's sales were \$20 million last year. Canadian and Japanese satellites are expected to heighten the competition within the next decade.

"The big deal is when you add together the different attributes of these systems," said Timothy Alexander, a partner in Satellite Development Services, based in the District. "We can only barely discern what we will be able to do."



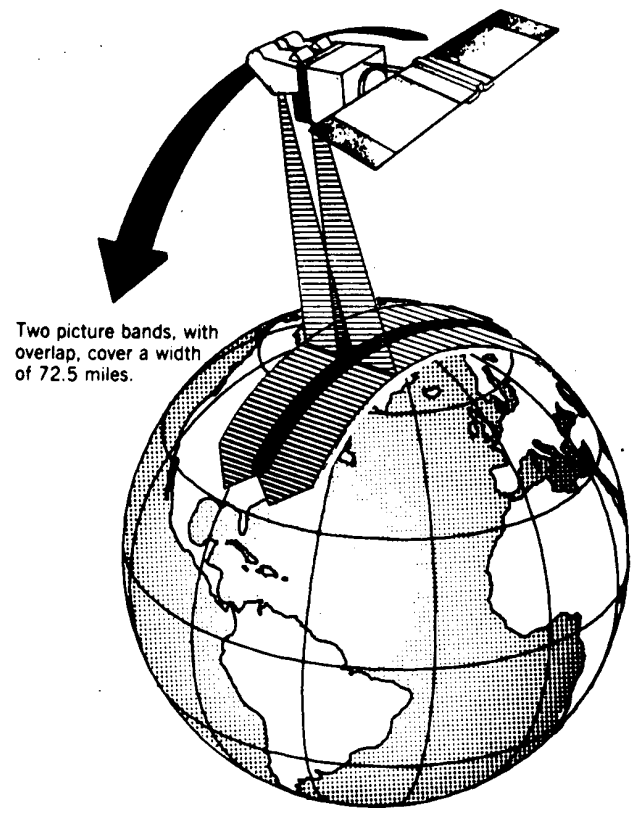
UNITED PRESS INTERNATIONAL/REUTER



UNITED PRESS INTERNATIONAL/REUTER

At left, the Chernobyl nuclear plant as photographed by the Landsat 5 satellite at 9:45 a.m. local Kiev time on Tuesday. The plant is located at the upper left edge of the cooling pond. Below left, an enlargement of the plant.

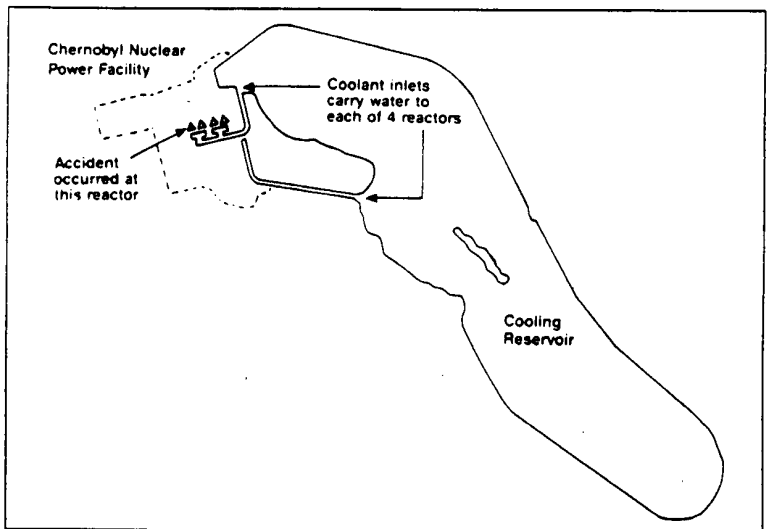
### THE SPOT SATELLITE



Two picture bands, with overlap, cover a width of 72.5 miles.

The Spot satellite's orbit and adjustable mirrors enable it to produce photos of virtually every place on Earth, and to view the same location as often as twice a week. The satellite orbits the Earth moving from pole to pole as the Earth turns beneath it, taking 26 days to cover the globe. The mirrors allow Spot to view at an angle, enabling it to photograph locations directly beneath it and to the sides. Viewing at an angle, Spot can take two images of the same location within a few days and can produce a stereoscopic, or "three-dimensional" picture.

THE WASHINGTON POST



UNITED PRESS INTERNATIONAL

ARTICLE APPEARED  
ON PAGE 23A

MIAMI HERALD  
1 May 1986

# Single U.S. spy satellite sending pictures

By CARL M. CANNON  
Herald Washington Bureau

WASHINGTON — Less than 24 hours after the Soviet news agency Tass tersely announced an accident at the Chernobyl nuclear power plant near Kiev, high-ranking U.S. officials had in their possession detailed photographs of the damaged plant.

Government experts said officials at the Pentagon and CIA could tell by looking at the pictures that the plant was still burning, that the fire threatened a second reactor and that the initial Soviet casualty report — two dead — was absurd.

"We know a lot more about it than the residents of Kiev," said David Holiday, an official with the Senate Intelligence Committee briefed by the CIA. "But then, we usually do."

In this case, the Americans know because of a satellite called the KH-11, code-named "Keyhole."

From an altitude of 150 miles and within seconds, it can send back to earth telephoto television signals so detailed that pictures made from the signals can show a soccer ball on a field or dividing lines in a parking lot, according to several intelligence experts.

"This is our only photo satellite up there right now, but it's the best there is," said Jeffrey Richelson, an American University professor and satellite expert.

According to Richelson and other sources, the electronic signals from the KH-11 are sent to a relay satellite called Satellite Data System, which sends the signals to Fort Belvoir, Va. There, the television images can be made into photographs.

In layman's terms, the KH-11 is similar to a 10-ton camera with a huge telephoto lens. It uses a series of huge mirrors to magnify items on the ground and is perfect for observing the kind of fire raging at Chernobyl.

The United States has numerous "early warning" satellites designed to detect nuclear explosions, but they did not detect the relatively small-scale chemical explosion at the Chernobyl plant, according to scientific experts.

U.S. officials won't formally acknowledge the existence of their spy satellites, but they have had particular trouble keeping the KH-11 a secret.

In 1975, Christopher Boyce, a \$145-a-week code clerk at TRW in El Segundo, Calif., began selling the Soviets secrets about the satellites the company produced, including the KH-11. Before Boyce was sentenced to prison, the CIA discovered that one of its agents, William Kampiles, had sold the Soviets the KH-11's technical manual.

But this week, U.S. intelligence officials were said to be pleased at how rapidly they had provided pictures of the Chernobyl disaster. Right

up until last week, a debate had raged inside the intelligence community over whether the United States was undermined in the field of reconnaissance satellites.

Government policy has been to keep two KH-11's orbiting the earth so that one would always be covering the Soviet Union, but, as one intelligence source said Wednesday, "Our rockets

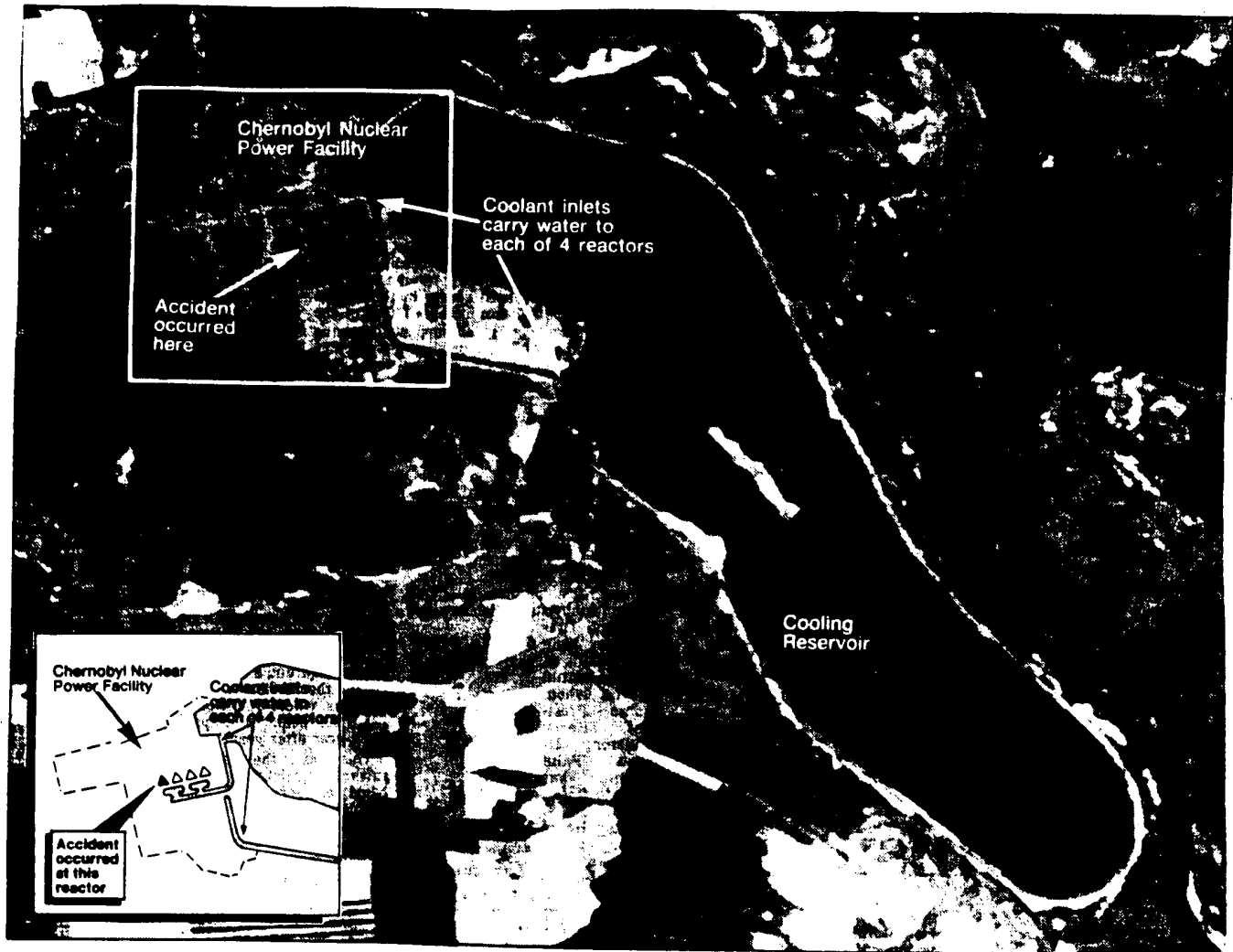
keep blowing up."

Last August, a second KH-11 satellite fell into the Pacific shortly after it was launched aboard a Titan rocket from Vandenberg Air Force Base in California. And April 18, intelligence sources said, another Titan rocket carrying yet another KH-11 exploded at Vandenberg on launch.

"Still, getting these photographs so quickly

demonstrates pretty conclusively that there is no crisis in our reconnaissance capabilities," said John Pike, associate director for space policy of the Federation of American Scientists. "If anybody had concern about our ability to verify treaties or check up on the Russians, this demonstrates that there's not a problem there — even with only one satellite."

Continued



This photo of Chernobyl nuclear plant and surrounding area was taken Tuesday by a civilian satellite — not the Pentagon's high-powered KH-11 satellite.

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# Major Blast, Meltdown Seen by U.S.

By JAMES GERSTENZANG  
and RUDY ABRAMSON,  
*Times Staff Writers*

WASHINGTON—The accident at a Soviet nuclear power plant involved "quite an explosion," apparently followed by a meltdown in the reactor, Administration sources said Tuesday.

The officials, speaking on the condition of anonymity and refusing to disclose the precise sources of their information, said that intelligence data shows a roof blown away, walls at least partly crumbled and evidence of continuing fire three days after the explosion, which is believed to have occurred Saturday.

The officials who studied the information concluded that there has been no equivalent accident in the history of the U.S. nuclear power industry.

## 'Quite an Explosion'

"There was quite an explosion," said one official, adding that the site of the blast, the Chernobyl power complex, was "possibly" continuing to emit radioactive gases. The plant is about 60 miles north of Kiev, capital of the Ukraine.

Officials agreed that there was no evidence of a nuclear explosion.

"A chemical explosion which led to a meltdown—that's the way I understand it to be," a senior Administration official said. A meltdown involves the partial or total melting of a nuclear reactor's fuel.

Reactor experts speculated that a chemical leak allowed a volatile mixture to form, or that refueling operations may have caused the blast.

## Lethal Radiation Levels

Sen. Malcolm Wallop (R-Wyo.), after a closed CIA briefing for senators, said there were "extraor-

dinary high levels of radiation, some of which are high enough to cause instantaneous death" and others sufficient to bring death within weeks.

Wallop and Sen. Alan K. Simpson (R-Wyo.), who took part in the Senate investigation of the nuclear incident at Pennsylvania's Three Mile Island plant in 1979, said that "direct radiation exposure" was 100,000 to 200,000 times greater at Chernobyl than at Three Mile Island.

"There is so much radioactivity in the vicinity of the fire that to get humans anywhere near the fire is impossible," Wallop said. In addition, he said that "radioactive iodine falling on pasture grasses (which feed dairy cows) represents a high risk to Soviet infants."

"The (radioactive) core is burning much like charcoal," Simpson said, adding, "here you have a completely exposed core" because there is no vessel to contain it.

The Soviet Union has said that two people were killed as a result of the accident. But Kenneth L. Adelman, director of the U.S. Arms Control and Disarmament Agency, told a Senate committee that this account is "frankly preposterous in terms of an accident of this magnitude."

About 1,000 people were believed to work at each plant during each shift, although officials were uncertain how many people were in the plant at the time of the blast or whether any warnings were given before the explosion occurred.

A U.S. nuclear expert who has visited the Chernobyl reactor complex said that the four reactors were housed in sheet metal buildings, none of them inside a pressure vessel. The Soviets have turned to containment vessels in recent years, reflecting their ambition to sell power plants to other countries.

According to American nuclear experts, the Soviet decision to build reactors without containment vessels was less a question of cost reduction than of design philosophy. Such vessels are intended to contain radioactivity in the event of an accident.

Sources said that the Chernobyl reactors apparently had demonstrated impressive reliability until now, and the Soviets have moved to scale the design up to plants of 1,500-megawatt capacity.

In the United States, the issue of containment vessels was controversial during early development of nuclear power reactors. Rep. Morris K. Udall (D-Ariz.), chairman of the House Interior Committee, said that the U.S. decision to require vessels around nuclear reactors to contain possible radiation leaks was "very wise," even though it added enormously to the cost of atomic power plants.

The Soviet reactors use graphite to slow the neutrons escaping from the atoms of nuclear fuel, normally preventing explosions and regulating the chain reaction that generates electricity. Most U.S. reactors, by contrast, use water as moderators.

Although graphite is a highly effective moderator, it is also highly volatile, and U.S. reactor experts speculated that a water leak, allowing water and super-heated graphite to form an explosive mixture, may have caused a chemical blast.

It was also thought possible that refueling operations may have caused the accident. Unlike U.S. reactors, which are shut down for weeks for refueling, the Soviets replace expended fuel rods while the reactor operates.

Wallop, reporting a possible scenario for the disaster that was raised in the CIA briefing, said that a "hot spot" may have developed on one or more of the fuel rods and that an explosion may have followed from a leak that brought about a buildup of hydrogen. Simpson said there was "obviously a failure of the cooling system."

In addition to the unknown number of injuries caused by the accident, the long-term financial toll on the Soviet Union, which relies heavily on civilian nuclear power, is expected to be enormous.

Replacing the destroyed plant is only the first cost. "You're talking about a facility of billions of dollars," one official said.

Beyond that, other plants of similar design may require modifications if the accident is determined to have been caused by a design flaw. If other nuclear plants must be shut even temporarily, officials predicted, the reduction of electrical-generating capacity could damage overall Soviet eco-

nomie production.

"It's going to run into a lot of rubles," a Reagan Administration official said.

The United States formally offered technical and humanitarian aid to the Soviet Union to help deal with the accident, but the Soviets made no response to the offer, State Department officials said.

The offer of assistance, announced by a spokesman for President Reagan during his visit to Bali, was formally given to Soviet charge d'affaires Oleg M. Sokolov by Assistant Secretary of State Rozanne Ridgway. Ridgway told Sokolov that Reagan and the United States feel "deep regret" over the accident, State Department spokesman Charles Redman said.

"We hope the Soviet Union will provide information about the accident in a timely manner," he added.

**Advice, Measurement**

State Department officials said that the United States offered five specific types of assistance, the Associated Press reported. These include:

—Technical advice on predicting radioactive-material dispersion based on geography, weather and the type of radioactive material released.

—An aerial measuring system that can map the spread of radioactive contamination.

—Radiological assistance teams to measure radioactivity in water, air and soil, and technical assistance in assessing environmental effects of the radioactive materials released.

—Medical personnel experienced in diagnosing and treating radioactive exposure.

—Technical assistance in radiological decontamination, in recovery from nuclear reactor accidents, and in minimization of environmental effects.

State Department officials said they have no reports that any Americans were injured in the disaster.

The State Department issued a formal travel advisory for "Kiev and adjacent areas," urging Americans not to go to the area. An official said that the advisory does not include the Soviet Baltic Sea coast, Finland or Sweden, where radiation from the accident has been detected.

Times staff writers Doyle McManus and Karen Tumulty contributed to this story.

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# Kremlin Aides Visit Area of Reactor

## Accident

### *Scope of Cleanup Believed Unmatched*

By Cass Peterson  
Washington Post Staff Writer

The Soviet Union faces an incredibly expensive cleanup operation in the wake of the accident at its nuclear station in Chernobyl and may be forced to declare some areas off-limits indefinitely, according to U.S. experts in decontaminating radioactive sites.

While the Soviets have released little information on the extent or severity of radioactive fallout from the reactor explosion and apparent meltdown, a U.S. interagency task force has estimated that lethal levels of radioactivity extended as much as three miles from the plant immediately after the accident and that extremely dangerous levels extended as far as seven miles.

"I don't think anybody has ever handled anything this size," said Wayne Bliss, director of the Environmental Protection Agency's radiation division in Las Vegas, which mainly assists in cleanups of military sites. "This is the worst acute contaminating event anybody has ever had."

The U.S. task force is seeking additional information on Chernobyl, partly in an effort to reassure Americans that they are in no danger from a similar disaster but also because of the wealth of data that the accident is expected to generate.

Nuclear Regulatory Commission official Harold Denton, a member of the task force who directed the cleanup at the Three Mile Island commercial reactor near Harrisburg, Pa., after its partial meltdown in March 1979, said the Chernobyl accident could provide the best lessons so far in how to cope with a serious nuclear accident. "This is not the absolute worst case," he said, "but it ranks right up there as to what you could expect."

No environmental cleanup was required in the area surrounding TMI, where a steel-and-concrete containment vessel held in most radioactive emissions. Nonetheless, it was three years before operators could lower a television camera into the contaminated reactor and another year before the first technicians, equipped with special tools, entered the crippled reactor to begin decontamination.

"You can go in TMI now," Denton said. "Workmen are standing above the core, which is underwater, using special robot tools to scoop up the radioactive material for disposal . . . This one [Chernobyl] has the core open to the air, with the same level of destruction. This is a major, major cleanup."

The United States has some experience in similar cleanups, with mixed success. A major effort on the Bikini Atoll in the Marshall Islands, contaminated by fallout from an atomic bomb test in 1954, has not reduced radioactivity enough to permit the return of residents.

Islanders returned briefly in 1969 but were evacuated again when it was discovered that food crops on the island were taking up radioactivity at dangerous levels. Two years ago, a scientific committee estimated it would take another \$40 million to remove 11 inches of topsoil and revegetate the island.

Bikini Atoll is less than two square miles in size. The area thought to have sustained significant environmental damage around Chernobyl, by contrast, is a minimum of 40 square miles and probably far larger.

The largest areas treated in the United States for radioactive contamination are the nuclear test sites in Nevada, which are neither populated nor suitable for agriculture. Bliss estimated that about 80 acres have been coated with ordinary road oil to prevent radioactive particles from being wafted into the atmosphere.

The Soviets' task will be complicated by the fact that Chernobyl is situated in the Ukraine, the nation's breadbasket, which together with

four smaller republics just north of the nuclear station produces more than one-third of the nation's winter wheat and dairy products, as well as substantial amounts of sugar beets, vegetables and fruits.

The plant also sits near the Dnieper River, which supplies agricultural irrigation water as well as drinking water for Kiev, a city of 2.4 million, and other Soviet cities on its way south to the Black Sea.

"We've never had anything contaminated so widely and with such high levels of radioactivity," Denton said.

At the worst, heavily contaminated soils might have to be dredged up and disposed of elsewhere, stripping the land of its most productive topsoil, or abandoned for crop and grazing purposes for decades while radioactive particles decay to safe levels.

Less drastic measures may be possible in less severely damaged areas, such as the use of chelating agents to bind some isotopes and prevent plants from taking them up, or deep plowing to mix and dilute radioactive materials in the soil.

"But there are points where you don't want to use pastures or fields for anything," Bliss said.

The Soviets reportedly faced a similar situation 30 years ago when an explosion contaminated a wide area near Kyshtym in the eastern Ural Mountains. According to published reports from CIA documents and emigre Soviet scientists, 30 villages were abandoned after that accident, more than 100 square miles were declared a "dead zone" and a river was rerouted to avoid contamination.

A far less severe accident happened in 1966, when an American B52 collided with its refueling plane near the coast of Spain and spilled four hydrogen bombs. Two of the bombs ruptured on impact, spreading plutonium and uranium over two areas several hundred feet in diameter. U.S. officials dredged up more than 1,000 tons of topsoil and veg-



etation and took it back to the United States for disposal.

Just how far dangerous levels of radioactive particles from Chernobyl might have spread is a matter of speculation.

According to the U.S. task force, areas within seven miles of the plant clearly will require long-term decontamination, but without data on local weather conditions and terrain, it is not possible to know how much additional land has been damaged.

The only experience at all comparable to Chernobyl in the United States was a deliberate test by the Atomic Energy Commission in 1965. The commission hauled a small reactor on a flatbed railroad car to a site near Jackass Flats, Nev., and dropped the fuel rods out in an effort to determine the effects of a runaway nuclear reactor.

The reactor exploded, releasing lethal levels of radioactivity in the immediate vicinity. Cesium and strontium 90 isotopes were detected in samples of milk from cows grazing near Bakersfield, Calif., 175 miles away, but not at levels considered dangerous.

The Chernobyl accident would have released much higher doses, because of the size of the reactor,

but just how much more would depend on the amount of fuel in the reactor, how long the fuel had been in use and the power level at the time of the accident.

In a television interview Friday from West Germany, a Soviet official said water reservoirs near the plant were contaminated, an occurrence that U.S. officials considered unavoidable. The plant sits near the Pripyat River, a tributary of the Dnieper.

But water contamination may pose less difficulty than soil contamination, according to Bliss, who said initial doses of radiation have probably been flushed downriver and diluted, and standard city water treatment facilities remove much radioactivity through carbon filters.

Some isotopes may settle in river or reservoir sediment or be taken up quickly by algae and other vegetation, where they can enter the food chain through fish and other animals, he said. "These compounds very likely will dissolve easily, like table salt, and they will move quite a ways," he said.

Rooftop cisterns, used in many countries to collect rainwater for household use, could be heavily contaminated, but well water "should

not be contaminated if people have reasonable wellheads," he said.

As for food products, Bliss said that leafy vegetables and grasses will probably have to be destroyed or disposed of in some manner.

"Root vegetables are probably all right if they are washed and checked," he said. "Uptake won't occur rapidly and there are safe levels of radioactivity in consumer products without subjecting the public to great risks."

For future crops, however, the soil might have to be treated with agents to prevent plants from taking up excessive quantities of radioactive materials. Potassium fertilizers, for example, can restrict the uptake of radioactive cesium by plants in much the same way potassium iodide protects humans from radioactive iodine.

While it is impossible to estimate the overall cost of any cleanup operation at Chernobyl, Bliss noted that the United States spent \$15 million in just a few days seeking the radioactive remains of a Soviet spy satellite that crashed in Canada in 1978.

"This is going to make that look a trip to the candy store," he said.