

NUCLEAR MONITOR

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WHAT DID WE LEARN FROM THREE MILE ISLAND?

We learned the obvious – that a combination of bad design, mechanical failure and operator error can lead to a nuclear meltdown, widespread panic, and scared and dying people. If we did not learn that then, we certainly did seven years later at Chernobyl.

(605-606.5583) NIRS - We learned that nuclear power, if it is to be even remotely safe, is not cheap; nuclear utilities spent tens of millions of dollars refitting existing reactors to meet post-TMI safety guidelines. Utilities building reactors at the time were forced to spend more to meet stricter safety standards. Of course, none of that made the reactors safe, nothing can.

We learned that electric utilities, once considered a safe stock option for widowers and retirement funds, lie when threatened, and that governments lie to protect them.

A significant number of people learned that their homes and their lives really were not very important to institutions many had thought little about—the federal Nuclear Regulatory Commission, the US Congress, the Judiciary, the utilities, state governments, nuclear trade associations, the National Cancer Institute, just about every big-time player in the business of providing electricity and reinsurance to the United States. Instead, they learned that their homes and lives were pretty much expendable to the myth of safe nuclear power.

In the end, that may have been the

biggest, longest-lasting lesson: people are expendable when the nuclear industry is in trouble.

That is, admittedly, a sad commentary. Many of those who have caused that lesson to sink in would vigorously deny it. They would say, no, TMI did not kill anyone, the accident was contained and no, we do not want to admit anything.

Of course, they may well believe themselves, but the facts prove otherwise, as does real life. The facts, and real life, show that cancer rates have risen since the TMI accident, in precisely those areas most impacted by the radiation releases. The facts, and real life, demonstrate that TMI *did* kill - people, animals, plants - and caused mutations that still provoke a combination of wonder and disgust.

The facts, and real life, admit that some 2,000 cases of harm were settled out of court for millions of dollars and records sealed because the utility did not want to admit the fact, and the reality of the TMI accident. Potentially thousands more cases were thrown out of court, because the court did not want to admit into evidence the facts, and reality, that more radiation was released from TMI than the utility and government want to admit.

The court can hide behind its judicial powers, but the facts and reality stand out nonetheless. People died because of Three Mile Island, and anyone who

SPECIAL ISSUE: 25 YEARS SINCE THE TMI DISASTER

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tries to tell you differently does not know the facts, nor the reality.

Just as some people and institutions would try to make you believe that only a few dozen people died as a result of Chernobyl - all firefighters and reactor operators - when, in fact, thousands, probably tens of thousands will die prematurely because of that accident, some people and institutions try to proclaim TMI as some sort of "success," some sort of proof that the nuclear age does not kill.

It is difficult, of course, to prove that a cancer is a direct result of any single thing – even cigarette smoking is for some a debatable cause of cancer. So it is for nuclear utilities also. Who, after all, would want to be blamed for death and destruction? Much better to blame it on unknown, unseen, or already improper influences. When Dr. Steve Wing finds stark evidence of increased cancer rates directly attributable to radiation released from TMI, of course those who caused it want to deny it. Especially since it might affect their ability to continue that industry.

And, 25 years later, is that not where we have arrived? Whether or not the nuclear industry will continue? Three Mile Island was not a local mishap, it was an international awakening and acknowledgement that nuclear power is a technology without fail-safe guarantees, it was the live demonstration that there is no such thing as inherently-safe nuclear power.

Back in 1979, a lot of people thought we would have learned our lesson by

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now. Nuclear power would be dead, or at least clearly on its way out. Even former US President Jimmy Carter, who toured TMI clad in little plastic booties to reassure an anxious nation, sought to create a renewable energy-powered future. And if TMI, and then Chernobyl, failed to kill the industry, then the waste problem will...

Give nuclear industry some credit, it is a resilient industry, one that takes punches and bounces back as if nothing had ever happened. It is an industry that can cause utilities purchasing its products to drown into bankruptcy, and then, without even taking a breath, espouse its economic benefits.

It is an industry that has no hesitation in arguing that creating the world's most tempting terrorist target – thousands of high-level nuclear waste casks sitting unguarded in an open-air parking lot in Nevada – is somehow preferable to dispersed, protected storage at 70 or so nuclear reactor sites. In short, it is an industry that has no shame.

Even worse, it is a shameless industry that has many high-level backers. Senate Energy Committee Chairman Pete Domenici, for one wants to create, in his own words, a "nuclear corridor" running from the Texas border to the outskirts of Albuquerque. Senator Larry Craig of Idaho wants to move Idaho's high-level waste to Yucca Mountain, but nonetheless has steadfastly promoted construction of a new reactor in his state to produce hydrogen for a non-existent hydrogen fuel cell program for automobiles. New House Energy Committee Chairman Joe Barton is another who has yet to meet a nuclear-related program, initiative or relaxation of regulations to benefit the nuclear industry that he doesn't like.

And that is just in the U.S.! Across the world, the nuclear power industry is fighting back. You can read it in their internal communications; this industry feels like it has been trod upon and stomped down and we, the people, are interfering with their right

to pollute, irradiate and kill as many of us as they choose, and by God, they're tired of that opposition!

Now Finland has ordered a new reactor. The temporary moratorium on new reactors in France is in jeopardy because of French nuclear pressure. In Asia, they still build reactors, don't they? And in the U.S., hiding behind the smokescreen of a licensing process that allows utilities to obtain essential site permits without ever admitting they want to build a reactor, there are three utilities seeking permits to build reactors. No, we are not fooled, we know what an Early Site Permit means – it is not just the first chance to participate in reactor licensing decisions, it is the last chance. After this, it is too late, the utility can do what it wants.

This is why NIRS and Public Citizen, together with BREDL and other local and regional groups, have joined forces to challenge every single Early Site Permit applications being considered by the NRC: at Grand Gulf, Mississippi; North Anna, Virginia; and Clinton, Illinois.

Everywhere the nuclear industry goes, we must be there too, working tirelessly to remind people that nuclear power is not what its backers claim: it is not emission-free – reactors routinely emit radiation; it is not safe, people have died and continue to die from reactor accidents; the waste is not manageable, in fact, there is no place to put it; nuclear power is not economic, when its full costs are counted, it cannot compete with any energy source.

So, 25 years after we learned first-hand that the nuclear industry was everything its opponents feared, and not much of what its backers touted – and how it kept backers after losing US\$1 billion dollar investment in a few hours is still startling – where do we stand? It would be comforting to argue that we are on the verge of a new energy age, one in which everyone has access to all the energy they need, clean, affordable and sustainable, but we are not there yet. It would be

WHAT HAPPENED AT TMI-2?

Between 3 and 4 a.m. on 28 March 1979, maintenance work was conducted at the secondary cooling system in the turbine building of Three Mile Island reactor 2. TMI-2, located near Harrisburg in the state of Pennsylvania, was an 880 MW reactor, built by Babcock & Wilcox. Metropolitan Edison Company (MetEd), a subsidiary of TMI owner General Public Utilities (GPU) operated both TMI reactors. TMI-2 was connected to the grid in April 1978 and was running for almost a year when the accident happened.

At around 4 a.m., a valve in the condenser closed causing circulation in the secondary coolant circuit to stop. The two main feedwater pumps stopped due to a lack of water and the turbine also scrambled and as a consequence heat was no longer removed from the steam generators. With non-functioning steam generators, the temperature and pressure in the primary cooling circuit started to rise. As increasing pressure could lead to pipes rupturing, a valve (Pilot Operated Relief Valve) opened automatically to release steam/water. The reactor itself also shut down automatically as its control rods were released. So far, everything was working as expected in emergency shutdowns.

The problems escalated when the pressure in the primary circuit began to drop. At that moment, the relief valve should have closed in order to prevent too much water being released from the cooling circuit but the valve remained opened, although an indicator in the control room wrongly showed that it had closed. This was caused by a design fault: the indicator only showed electricity supply to the valve but not whether it had really closed or not. With the valve open, more and more water escaped from the reactor.

Another problem occurred when emergency coolant pumps of the secondary circuit were started. Two valves in the feedwater pipes were blocked and no water could be transported to the steam generators, which ran dry. After eight minutes, the valves were opened manually.

As coolant continued to escape from the relief valve, the instruments available to reactor operators provided confusing information. None of the instruments showed the actual level of water in the reactor. The operators judged it by the level in the pressurizer (connected to the relief valve), which was still high so they were unaware of the decreasing level of water in the reactor core.

Because of the residual heat in the uranium fuel and the lack of sufficient cooling, the fuel cladding started to burst and the fuel began to melt. Within eight hours the core was (partly or completely) dry and melted fuel dropped to the bottom of the reactor vessel. It was later found that about one-half of the core had melted.

On 28 and 30 March radioactive gases were released from the plant. For the public, there was much uncertainty about the situation in the plant. The governor of Pennsylvania decided on 30 March to evacuate all pregnant women and young children within 5 miles (8 kilometers) of the reactor. Another 200,000 people left voluntarily, because of a lack of trust in the information provided by MetEd.

In 1980, decontamination work in the reactor buildings started. The reactor vessel lid was lifted in 1984 and removal work could begin inside the reactor. It was discovered that core damage and temperature levels had been much higher and water levels much lower than previously assumed. The molten fuel was removed between 1985 and 1990 and transported to the Idaho Nuclear Engineering Laboratory (INEL). Decontamination work was completed in 1993. Final dismantling of the reactor will be conducted when TMI-1 (still in operation) is to be dismantled.

Sources: Herman Damveld, 25 February 2004; www.nrc.gov fact sheet on TMI

upsetting to think our future is solely nuclear, with a national security state ensuring that radiation leaks are never reported. In reality, we are somewhere between the two. There are more cases to be made, certainly better economic cases, that the first hypothesis is closer than the second, but that is by no means guaranteed. To create a better energy future, a better environmental future, a better economic future, is not an easy task. It requires incessant

work, argument, education, organization and mobilization.

Three Mile Island dealt a blow to the nuclear power industry. Some hoped it would be a fatal blow, but it was not. Others hoped it would be a glancing blow; but it was not that either. 25 years later, arguments remain over what happened, who suffered and what was learned. If you look at the facts, the reality, there is really no doubt. If

you talk to people who were there you will not doubt them. If you look at the science, you will not doubt it.

The next time you think about nuclear power, think not about an abstract cooling tower or reactor building behind a grove of trees. Think instead about the metallic taste people near TMI still feel in their mouths when they think about the accident. Think about the fear of pregnant women,

told to evacuate more than 52 hours after the accident – then think about how the world criticized Ukraine for waiting 48 hours to issue an evacuation warning. Think about what the pain of cancer really feels like, and why some people in power feel compelled to deny it exists, when it is so clearly proven. Think about the dollars lost that day, and then think about the dollars the nuclear power industry still hopes to gain.

And that, in the end, is the lesson of TMI. Reactor accidents will happen, as

long as there are reactors. The odds are it will not happen tomorrow, the odds just as conclusively are that it will happen again, in our lifetimes, perhaps even worse than ever. Stopping that reality means acquiring political power, because it will not stop by itself. If it did, if mere argument or persuasion or self-evident reality were sufficient, we would have won a long time ago. But it is not enough, political power is required and too often we surrender to the strength of our own arguments and say if "they" do not understand that, what

can we do? The problem is that "they" understand power, and what we need to do is very clear: educate, do not expect TV to do it for us; organize, and don't stop; mobilize, and bring people out; and then do the same all over again... And if we all do that, then, in the history books, we can say: well, it took a while but in the end, the TMI accident really was the beginning of the end of nuclear power.

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A QUESTION OF DOSE...THEY CHEATED, THEY LIED, PEOPLE DIED....

Some years ago, the father of the U.S. nuclear navy, Admiral Hyman Rickover, stated that if the full truth were known about the accident at Three Mile Island, it would have destroyed the civilian nuclear power industry because the accident was infinitely more dangerous than was ever made public. At TMI, the utility falsified reactor coolant water leak rate data, cheated on NRC control room operator tests before and after the accident, and lied about the severity of the accident.

(605-606.5584) **Mary Osborn Ouassiai** - For three days, children waited for school buses and played outdoors in the plumes and clouds of fallout, until Pennsylvania Governor Richard Thornburgh reluctantly advised those most vulnerable to leave the area. The cheating, lying, falsification of reactor data and the failure of governments to consider safety above finances, resulted in illness and death for friends, neighbors, loved ones and many TMI workers.

Confusion, scientific fraud and miscarriage of justice are the legacies of the TMI accident. Confusion by the nuclear apologists claiming that insufficient radiation escaped during the accident to cause any of the effects people experienced. Scientific fraud pertains to the fallout dose reports that have never been honestly peer reviewed or legally challenged.

Miscarriage of justice at the hands of the judge who ordered a finding of "no high doses" by the TMI Public Health Fund. The same judge prohibited the health fund's advisors from participating as experts in the personal injury class action lawsuits, and also threw out most of the scientific

experts, making it near impossible to go to trial. This judge, in essence, became the jury deciding the case without trial. Attorneys for plaintiffs recently quit the case, heaping more injustice on over 2,000 victims and no end to the legacy of the TMI accident.

Unless you lived through the terrifying days and weeks of the accident you will never be able to understand or relate to how we felt then or how we feel now. Sounds, smells, voices and words are etched within us. The voice of commentator Walter Cronkite on the evening news announcing the accident to Harrisburg and the world. The sound of sirens or church bells ringing, instantly flash us back to 30 March, 1979 - known as Black Friday, the day of uncontrolled radiation releases and evacuation.

The incredible metallic taste* or smell, the saltiness, the thiosulfate-peroxide smells, and the "dead-fishy" smell, remind us of something evil that destroyed our previously happy way of life. We remember the voices of our children and our inability as parents to protect them from the invisible, unforgiving poisons in our air. We remember our neighbors down

river exposed to the radioactive water dumped from TMI into the Susquehanna River from which their drinking and bathing water was obtained.

Other voices introduced us to the second disaster at TMI, exposing dishonesty and betrayal by those entrusted with protecting our health and safety: the utility's Jack Herbein, telling us that everything was under control and later discovering from Lt. Governor William Scranton, Jr., that it wasn't under control. The voice of Governor Thornburgh reluctantly "advising" those most vulnerable to leave; while ignoring those of us living beyond the five-mile zone receiving doses, as though there was a magic wall that would stop the radiation. (Each person living within 50 miles of the reactor was assessed a radiation dose, which on paper, resulted in low exposures.)

Even voices we didn't hear had an impact: for example, the mountains of transcripts and the audio-taped voices of the NRC Commissioners, who never wanted responsibility for ordering an evacuation then and who still refuse to take claim responsibility now. Voices

silenced at the NRC, knowing leak rate tests were falsified for half a year prior to the accident at TMI; those voices never ordered the utility to shut down the reactor as required by their own regulations.

During the first days of the accident we did not know the solid reactor fuel was melting into liquid, flowing like "hot olive oil," nor that TMI was burping, venting and dumping radioactivity into our communities, our river and our bodies. But our bodies knew, and the animals knew. Our bodies reacted by displaying symptoms and effects: the metallic taste or smell, burning or reddening of skin, burning in nose or throat, itching or tearing of eyes, the nausea, vomiting, the subsequent diarrhea and hair loss. Birds died. Many of our pets and farm animals died and others were born deformed. Flowers and leaves grew deformed and mutated; many trees died and still continue to do so.

What caused all this? To this day, we were never told the cause but were reassured by Met-Ed, the utility that owned TMI and by our government that TMI was not responsible because not enough radiation had escaped. Improbability ruled as official science eagerly exonerated TMI as the source of these maladies; but whatever radiation escaped TMI, *these effects did occur*. Either low dose caused the effects or the doses were indeed much higher than admitted. If Three Mile Island didn't do it, what did?

The late Dr. Carl J. Johnson stated that, "... people can give us a medical history, associating symptoms and physical signs with relevant events," and furthermore, "These simple observations are equally important in the study of the effects or nuclear radiation on populations." Humans, unlike animals and plants, have the ability to communicate and discuss their symptoms and ailments. Many people reported symptoms to Three Mile Island Alert and to the Governor's "Hotline" during and following the accident. Harrisburg's Mayor, Stephen R. Reed, then a state representative, wrote a letter to the NRC asking them

why they refused to look into allegations of radiation effects. The NRC's Harold Denton, then the top official in charge of the TMI accident said – and to this day the response at the NRC is the same – doses were too low, so TMI could not be the cause.

The tragedy at Chernobyl, where victims also experienced the metallic taste and far-greater effects, has since verified our allegations and vindicated our actions and beliefs.

The question of dose remains a major issue because of the unique symptoms experienced during the accident and in

subsequent years. The symptoms were critical evidence, if they had not existed, the issue of health effects would have never arisen.

It takes just one affected cell to initiate cancer; radiation damage on the body is cumulative. An accident does not need to occur at your local atomic power plant for you to be harmed because radiation releases occur during routine operations on a daily basis venting approximately 30 curies daily or 1000 curies monthly. (1)

In over fifty years of atomic fallout, there is still no definition of "low

BUSH'S NUCLEAR FAMILY

It is fair to question why the current Bush administration, including George W. and Dick Cheney, is so very pro-nuclear power - not to mention its interest in expanding the U.S. nuclear weapons arsenal. Kevin Phillips' recent book "American Dynasty: Aristocracy, Fortune, and the Politics of Deceit in the House of Bush" aims to shed a little light on the matter.

Prescott Bush (later a U.S. Senator for Connecticut who harbored hopes of becoming president), grandfather of George W. and father of George H.W., sat on the boards of directors for both Dresser Industries and Vanadium Corporation of America in the 1940's and 1950's. Both companies were involved in the Manhattan Project and subsequent atomic bomb development. (pg. 129) During and after World War II, Dresser provided several federal agencies with highly specialized and highly classified products: pumps for gaseous diffusion enrichment of uranium to bomb-grade; spiraxial compressors for nuclear submarines; launcher buildings for BOMARC (Boeing-Michigan Aeronautical Research Center) missiles; radioactivity monitors for nuclear attack missile-tracking systems. (pg. 153) Vanadium supplied the U.S. military with uranium ore during the Manhattan Project. (pg. 197)

Dresser reportedly went on to supply

the faulty valve that initiated the Three Mile Island accident and according to Phillips, is now a part of the Halliburton corporate empire formerly headed by Dick Cheney. ("The Diane Rehm Show," National Public Radio, Feb. 10, 2004) Speaking of Iraq, Phillips points out that in 1989 and early 1990, a year or so before the confrontation that became the first Persian Gulf War, the George H.W. Bush administration knew but appeared unconcerned that U.S. exports were assisting Iraq's nuclear weapons development. Two nuclear scientists from Saddam Hussein's Al-Qaqaa nuclear research facility were even invited to Portland, Oregon to participate in a Department of Energy symposium on nuclear detonations in September 1989. (pg. 307; see also Alan Friedman's "Spider's Web: The Secret History of How the White House Illegally Armed Iraq," New York, Bantam Books, 1993, pg. 155).

European companies were not especially concerned about Iraq's nuclear ambitions either. In 1990, Urenco trained 22 Iraqi scientists in the highly-specialized art of centrifuge welding at its Gronau enrichment plant (The Nonproliferation Review, Fall 1996, p 128)..

All page references are to: Kevin Phillips, "American Dynasty: Aristocracy, Fortune, and the Politics of Deceit in the House of Bush," New York, Viking, 2004.

dose" radiation and there is no consensus among the scientific community as to what constitutes a low dose. Is it five Rems? Not in my book, not after TMI. The lip-burns and sore throats some experienced when the wind blew during the years of clean up had to be in the millirems range. Any dose is an overdose.

Even the nuclear industry's own expert, the late Dr. Jacob Fabrikant, stated, "...we believe that any exposure

to radiation, even at low levels of dose, carries some risk of such deleterious effects" (i.e., referring to carcinogenesis, teratogenesis and mutagenesis) (p.402) [meaning, cancer, birth defects and mutations]. At Three Mile Island the nuclear industry and government got away with murder.

*Met-Ed's report stated that no existing scientific evidence links the "metallic taste" to radiation, and not enough Iodine-131 escaped to cause the

taste. (A Report on the TMI-2 Accident and Related Health Studies" by GPU Nuclear) [But crewmembers of the Enola Gay reported this taste; Atomic Vets, A-bomb survivors and Chernobyl victims reported metallic taste.]

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(1) John Collins, NRC, interview in The People of TMI, DelTredici

BIAS ON HEALTH EFFECTS FROM TMI REFUTED

The official position that little or no radiation was released, and therefore no health effects could be ascribed to radiation from TMI, is carefully and thoughtfully toppled by Dr. Steve Wing in an analysis that spans the basic premise of scientific inquiry to a point by point examination, and rebuttal, of the criteria used by a US court to exclude Wing's own findings on health effects from the 1979 accident. (1)

(605-606.5585) NIRS - A landmark review of scientific and legal processes implemented to assess TMI's radiation health impacts written by Dr. Steven Wing of the University of North Carolina, Chapel Hill in the article titled "Objectivity and Ethics in Environmental Science" appeared in the November, 2003 issue of the journal *Environmental Health Perspective*. (2)

Key among Wing's findings is a statistically significant correlation between lung cancer incidence and relative level of radiation exposure during the accident. This finding was excluded from the court case brought by citizens of the Harrisburg area who felt they had suffered adverse health effects from the TMI disaster. As Wing writes: "The official position that high-level radiation exposures were impossible was questioned by hundreds of local residents who reported metallic taste, erythema, nausea, vomiting, diarrhea, hair loss, deaths of pets and farm and wild animals, and damage to plants. Many of these phenomena could be caused by radiation; however, the maximum possible dose was officially reported to be orders of magnitude less than the dose needed to produce acute symptoms. Residents were told that their symptoms were due to stress. People who pressed their concerns about radiation were treated

as though they had psychological problems."

That the court would not hear Wing's findings on lung cancer is a tragedy emblematic of the degree to which the nuclear industry has been able to dictate "justice" in the United States. Indeed, Wing takes care in this article to show that this situation predates his work, which was based on previous health impact studies. Wing quotes the actual court order that established the Columbia University studies upon which his work is based, stating that the order prohibited "worst case estimates of releases of radioactivity or population doses...[unless] such estimates would lead to a mathematical projection of less than 0.01 health effects." Wing also cites that this order specifies that a representative of the nuclear industry's insurance corporation had to "concur on the nature and scope of dosimetry projects."

Wing points out that the net result of the court arbitrarily banning any consideration that higher doses of radiation may in fact have occurred, was to consign the Columbian researchers to study TMI based on a hypothesis that could not be tested – since any finding, by order and definition, could not be associated with a radiological cause. Wing

describes the claims that "chance" could be the cause of statistically significant correlation between lung cancer and radiation dose as a confusion between gambling and real life. When cards are well shuffled, patterns occurring are due to chance but when there is nothing random about a distribution, the invocation of "chance" is simply a mask to reject actual possible causes. Wing writes: "Chance may have built an empire in the world of science, but its emperor has no clothes."

On the matter of Wing's findings on lung cancer, the court simply adopted the view of the defendant (the owner of TMI) that since there is a 10 year latency period on lung cancer, and the cases Wing studied occurred within 7 years of the accident, his findings could not be due to the TMI accident.

This assertion accepted by the judge as fact is easily rebutted by Wing: "There have been no epidemiological studies of the exposure of human populations to radioactive xenon and krypton gases [dominant in the TMI release]. Consequently, assumptions about the types and timing of cancers that could result must be based on inference from studies of other types of ionizing radiation. Defendants argued that the study of Japanese A-bomb survivors,

upon which official estimates of radiation risks and latency have been based, proved that lung cancer has a 10-year minimum latency. In response, we noted that ionizing radiation can act as a promoter as well as an initiator of cancer (3); that high doses can suppress immune function, which is associated with the appearance of secondary tumors within 2 years of radiotherapy (4); and that latencies of less than 5 years have been observed for miners exposed to radon (5). A recent study of lung cancer among uranium miners found the best estimate of minimum latency to be less than 1 year." (6)

Wing provides a detailed and elegant appraisal of the inappropriate elevation of the Japanese atomic victims to the "gold standard" for human radiation impact evaluation. He reminds us that they are a "select group...that had to resist radiation blast and the

aftermath of war" and that the dose to those individuals was never measured, but instead extrapolated from models and interviews of survivors conducted by US military occupation.

If Wing's findings on radiation and lung cancer had been admissible, it would have established a statistically significant correlation between radiation exposure and the occurrence of a major health consequence due to the TMI accident. The barring of this finding from evidence helped to contribute to the plight of thousands who have suffered from the Three Mile Island disaster, and never been compensated or officially recognized.

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Sources:

(1) Wing, S., Richardson, D., Crawford-Brown D. 1997 "A Reevaluation of Cancer Incidence near the Three Mile Island

Nuclear Plant: The Collision of Evidence and Assumptions." *Environmental Health Perspectives* 106:52-57

(2) *Environmental Health Perspectives*, Volume 111, Number 14, pages 1809-1818, includes map illustrating correlation between radiation emissions and incidence of lung cancer - see <http://ehp.niehs.nih.gov/members/2003/6200/6200.pdf>

(3) Doll R. 1978. An epidemiological perspective of the biology of cancer. *Cancer Res* 38:3573-3583.

(4) Appelbaum F. 1993. The influence of total dose, fractionation, dose rate, and distribution of total body irradiation on bone marrow transplantation. *Semin Oncol* 20:3-10.

(5) Hornung RW, Meinhardt TJ. 1987. Quantitative risk assessment of lung cancer in U.S. uranium miners. *Health Physics* 52:417-430. 1

(6) Langholz B, Thomas D, Xiang A, Stram D. 1999. Latency analysis in epidemiologic studies of occupational exposures: application to the Colorado Plateau uranium miners cohort. *Am J Ind Med* 35:246-256.

A PERSONAL REMEMBRANCE

Millions of words have been written about the worst commercial nuclear power accident in U.S. history. Very few have told much of the history from the perspective of the critics most directly involved in opposing the licensing and operation of the ill-fated Three Mile Island, Unit 2 reactor.

(605-606.5586) **Dr. Judith H. Johnsrud** - With my colleague, Dr. Chauncey Kepford, I represented those opposing the original licensing of TMI Unit 2, and intervened in both the operating license and restart proceedings for TMI Unit 1.

In 1970, two Babcock and Wilcox pressurized water reactors were under construction on an island in the Susquehanna River, within ten miles of Harrisburg, Pennsylvania's state capital. Harrisburg resident, Virginia Southard, who headed a small group, Citizens for a Safe Environment, contacted members of the Environmental Coalition on Nuclear Power (ECNP) shortly after we had been involved with preventing both an Atomic Energy Commission (AEC) Plowshare Program proposal to explode nuclear devices underground to create storage chambers for natural gas and a utility proposal to site a liquid metal fast breeder reactor on the upper Susquehanna River in

Wyoming County, PA. She asked if we could help her group oppose the operating licenses for both TMI Units 1 and 2.

When, in the mid-1970's, the Nuclear Regulatory Commission (NRC) announced an opportunity to intervene in the operating license proceedings for TMI-2, ECNP's leading technical members, Drs. Kepford, a radiation chemist, and William Lochstet, a professor of nuclear physics, offered to undertake the case.

Dr. Kepford's earlier questioning of the extent of projected radiation releases from the reactor had apparently resulted in the termination of his university position, a dismissal he successfully challenged. In 1968, I had experienced a similar consequence of my active opposition to the nuclear industry, having been warned "those who dissent from government policies cannot expect to be supported by the university." My doctoral fellowship

was suspended, and I was forbidden to publish anything about the Plowshare project if I wanted to complete the degree. Despite threat of reprisals, we felt obligated to try to protect the people of the Three Mile Island area to the best of our ability.

It was a time when many reactor licenses were being challenged. Reactor safety and environmental issues addressed in those 1977 license proceedings remain significant for all U.S. power reactors.

In the course of cross-examining utility and NRC staff witnesses, we encountered perhaps the single most fundamental basis for public concerns about the safety of nuclear power reactors. The NRC Atomic Safety and Licensing Board (ASLB) did not permit any questions on the probability or consequences of any accident more severe than safety systems were designed to withstand - severity was determined by NRC staff engineering

analyses. Moreover, we were also able to establish, on record, that the NRC staff had based safety conclusions on a "single failure mode" criterion, thereby apparently ignoring the potential consequences of multiple failures and "failure modes" and interactions that might occur in the course of an accident. This kind of analysis, we were told, was common to all reactor license approvals.

Second, Dr. Kepford was able to establish that the NRC's regulation summarizing the environmental impacts of the uranium fuel cycle for a 1000-megawatt reference reactor operating for a single year, had miscalculated the amounts of radon gas that would continue to emanate from uranium mill tailings piles for millions of years into the future.

Moreover, the NRC had underestimated each year's radon release associated with a reactor's operation, and also wrongly omitted the full health effects from those ongoing radon emissions. These issues, later confirmed by a member of the NRC's ASLB Panel, formed the basis of ECNP's 1978 challenge to the legality of the TMI-2 license before the Circuit Court of Appeals for the District of Columbia. Our challenge, which came within one vote of obtaining an injunction, could have prevented the reactor from beginning to operate commercially at the start of 1979.

In the aftermath of the accident at TMI, the NRC convened a special panel to determine whether the Price-Anderson liability insurance law would be required to take effect. That hearing was to decide if an "Extraordinary Nuclear Occurrence" had taken place and would trigger the Price-Anderson Act, to compensate members of the public at a mere seven cents on the dollar for the losses they suffered.

Despite the voluntary evacuation of nearly 150,000 residents in central Pennsylvania, large business and farming losses, and many reports of illnesses and birth defects over the ensuing years, it could not be established within a few months of the

accident that lives had been lost specifically due to radiation releases in the course of the TMI accident. However, some 2,000 cases related to the accident were settled out-of-court, and the records permanently sealed.

During the years of TMI-2 clean up that followed, numerous citizen groups, such as TMI Alert and PANE (People Against Nuclear Energy) formed and grew in the adjoining areas. They banded together to oppose the restart of the presumably undamaged TMI Unit 1 reactor.

The radiation standards still do not recognize the many other non-fatal, non-cancer impacts of ionizing radiation on human well-being.

A major issue for intervening parties was the adequacy of evacuation procedures. Before TMI, haphazard Emergency Planning Zones were only about four miles in diameter around the reactor. From a post-accident NRC document, we learned that the NRC's guidance recommendation was "sheltering," not evacuation, for the close-in population. State police witnesses testified that, if evacuation were to occur, residents who lived beyond the evacuation zone boundary might be prevented from evacuating until the close-in population had been moved – if they were to be evacuated. In the course of the TMI-1 Restart proceedings, we were able to establish, during cross-examination of an NRC staff evacuation witness that, during the course of a severe accident with offsite radiation releases, there was no maximum dose to members of the public above which the NRC would require that they be moved. To my astonishment, the official transcript failed to include the staff witness' response – an omission that was corrected by the Administrative Law Judge in the record at a later hearing.

TMI Unit 1 continues to operate and the Unit 2 reactor remains on Three Mile Island. It has not been decommissioned. Its fuel was

painstakingly removed and shipped across the continent for storage. Despite the assurances of many experts that there have been no serious health consequences, the NRC's and EPA's exposure standards still fail to account fully for all health impacts now found to be associated with low-level radiation. Many in the affected population of central Pennsylvania have moved away and their health is no longer monitored.

The burden of proof of radiation-related injury remains with the victims and remains extremely difficult to establish in the courts. Federal radiation exposure standards remain based on "Standard Man" – the healthy young male nuclear industry worker who chooses to receive occupational exposures.

The standards still ignore the greater sensitivities of unborn and/or young children, those with impaired health and the elderly. The standards remain based only on lifetime risk of fatal cancer and gross genetic defects in the first generations. The standards still do not recognize the many other non-fatal, non-cancer impacts of ionizing radiation on human well-being, nor do they take into account contemporary research findings of impacts of chronic internal doses received through inhalation and ingestion pathways.

Twenty-five years after TMI, the many epidemiological studies that show clusters of cancers and leukemia near nuclear facilities are still dismissed as too small to be "statistically significant."

Contact: Judith H. Johnsrud, Ph.D. through NIRS

“CRITICAL HOUR” IS CRITICAL READING

Timing is everything and Albert J. Fritsch, Arthur H. Purcell, and Mary Byrd Davis have done well to produce a new history of the nuclear power industry in the U.S., focusing on the 25th anniversary of America’s most-infamous meltdown.

(605-606.5587) NIRS - Titled “Critical Hour: Three Mile Island, the Nuclear Legacy, and National Security” (Yggdrasil Institute, 2004, 141 pages), the book appropriately begins: “The 25th anniversary of the Three Mile Island (TMI) nuclear accident is a fitting opportunity to renew the recommendation that narrowly missed being approved by the Carter-appointed TMI Commission a quarter of a century ago, namely, the request to phase out the nuclear power industry in this country. Having lost a golden opportunity then, we still have precious time left to reconsider the recommendation.”

The authors distill key moments from the 60+ year history of the Atomic Age, such as the evasiveness and ultimate failure of the 12 member Kemeny Commission investigating the TMI accident (of which Purcell served as senior staff) to “stick its collective neck out and call for a halt in nuclear power development, making official a condition that the U.S. marketplace was by that time imposing; not since the year before had any new domestic order been placed for a nuclear plant.”

Despite eight members leaning in favor of a moratorium at various points during the months following the TMI disaster, when a formal vote finally came the motion was defeated by a 6:6 tie. A non-decision dubbed a “Human Error” by the authors. In the face of the current prospect of a nuclear power relapse resulting in new reactor construction, “Critical Hour” argues we must seize this moment and change course to prevent another TMI, or worse.

The authors recount the “twenty-five years of conflicting data” on TMI’s health impacts. At one end of the spectrum, they cite NRC’s conclusion (NUREG-0738) that “many of the reported livestock problems were

probably the result of nutritional deficiencies.” The U.S. Atomic Energy Commission (AEC) used that same line in the 1950’s, under oath in federal court, to dismiss claims by Utah sheep farmers that their flocks were perishing in epidemic numbers from unrecognizable illnesses due to radioactive fallout from the newly opened nuclear weapons test site upwind in Nevada.

25 years later, the same federal judge who had presided over the case in the ‘50’s ruled that the AEC had perpetrated a fraud upon his court. In the late 1970’s, the same attorney representing the sheep farmers was able to show, with newly released documents, that the sheep deaths were entirely consistent with radiation damage, based upon AEC studies performed before the tests kept hidden during the original trial and for a quarter of a century afterward. That sordid history is told in John Fuller’s book “The Day We Bombed Utah.”

The authors first examine the TMI accident and its aftermath in detail, applying its relevance to the present day and then take the history of the Atomic Age one decade at a time, from the birth of the industry in the 1940s to the aging of the industry and deterioration of reactors in the 1990’s. An entire section is devoted to the “new dimension,” the reality of the potential for catastrophic terrorist attacks upon reactors or other nuclear facilities made clear by the events of 11 September, 2001. “But this history cannot stand alone. It must be coupled with a way out.” and thus they conclude with a very hopeful vision for “Conversion from Nuclear Power.”

The historical review in “Critical Hour” – including the Feb. 2000 steam generator tube rupture at Indian Point and the 2002 reactor vessel head corrosion hole at Davis-Besse, two recent examples of NRC putting

industry profits before public health and safety – inspires consideration of how the NRC of 1979, and 2004, is behaving like the AEC of 1953, to our peril.

Mary Byrd Davis’ chapter “The 1990s and Early 2000s: An Aging Industry” reviews trends in the nuclear power industry familiar to regular readers of this newsletter, such as: NRC rubberstamping reactor license extensions, power uprates, and new reactor designs; regulatory rollbacks on radioactive wastes and contamination; the shattering of any lingering illusions that civilian and military nuclear programs are unconnected; and industry consolidation. She reports convincingly on the increasing globalization of the nuclear power infrastructure: Canadian firm Cameco owns the only two uranium mines/mills currently active in the U.S.; European Urenco is central to the LES enrichment facility targeted at New Mexico; UK/Japanese/German/French involvement is central to nuclear fuel fabrication within the U.S.; Cogema, Belgonucleaire, and Framatome are central to the U.S. MOX program. Davis illustrates the key point that despite nuclear power industry sound bites to the contrary in this age of energy wars, “Nuclear power is becoming less and less a means to energy independence for the United States.”

Davis’ chapter “The Impact of September 11, 2001” leads directly to the overriding conclusion of the book, that nuclear power must be phased out, reactors shut down and radioactive waste secured and safeguarded (against accidents and leaks as well as terrorist attacks) as a national security measure before the unthinkable occurs. But “[d]espite the events of September 11, the [Bush] administration has not wavered in its announced intention of supporting the nuclear industry. Far from considering a phase out of the nuclear industry, it is

continuing to press for the industry's expansion." She details this nuclear power relapse at taxpayer expense, such as the Department of Energy's (DOE) "Nuclear Infrastructure and Education" program's attempt to revive dwindling nuclear engineering departments across the U.S. with millions of dollars in grants, fellowships, and scholarships to 14 universities.

Tellingly, the effort to repeal a 25-year-old state law blocking new reactor construction until a waste solution is found and economic merit established is being led by University of Wisconsin nuclear engineering professors; their department receives US\$30 million per year from DOE, according to a recent article ("Up and Atom?") in Madison's weekly paper *The Isthmus*.

Co-author Fritsch's upbeat nuclear power phase out plan concludes the book, laying out short-, medium-, and long-term steps for individuals and institutions, he demonstrates how energy conservation and efficiency can readily replace the "need" for nuclear power, and how renewable sources of electricity such as wind and solar can make large inroads against polluting fossil fuels. He ends with the hope that, although "many Americans are addicted to wasting energy," it will not take a nuclear meltdown or terrorist attack to motivate the American public to phase out nuclear power.

Citing Janet Sawin's "Charting a New Energy Future" in the Worldwatch Institute's "State of the World 2003," he conveys that "Including external costs such as damage to the environment,

the cost of generating electricity by wind on good wind sites is 4-6 cents per kilowatt hour. This contrasts with 6.3-19.8 cents for coal/lignite and 10.2-14.7 cents for nuclear energy, also counting external costs."

Fritsch, Purcell, and Byrd Davis dedicated their book "to the thousands of citizens who during the past half century have sought to publicize the dangers of nuclear power facilities." This book is a valuable new tool for this movement to develop and work more knowledgeably towards its goal of a nuclear-free world.

Contact: Kevin Kamps at kevin@nirs.org

NRC'S TMI FACT SHEET DISPUTED

Earlier this month, the federal Nuclear Regulatory Commission published a new "fact sheet" on the 1979 Three Mile Island accident. Three Mile Island Alert has published this critique of the NRC's work. The quotes in bold are from the NRC's fact sheet.

(605-606.5588) **Three Mile Island Alert - "The main feedwater pumps stopped running, caused by either a mechanical or electrical failure, which prevented the steam generators from removing heat."**

The problems did not start with the feedwater pumps, trouble began in the condensate polisher system. The NRC reported this in 1979 but states that they don't need to know the exact cause of the condensate polisher valves failure. No one knows why the accident began to this day.

"Signals available to the operator failed to show that the valve was still open... In addition, there was no clear signal that the pilot-operated relief valve was open."

Because TMI had been falsifying reactor leak rates to the NRC in the weeks leading to the accident, operators had learned to ignore the most obvious sign that the PORV had stuck open and that coolant was being lost through this pathway. The high temperature reading at the PORV drain line was a clear indication that coolant was escaping. But, operators had

become accustomed to this anomaly because of the criminal falsification which allowed this condition to exist for several weeks.

It should be noted that if the company had operated lawfully, the plant would have been shutdown for repairs and there would have been no accident on March 28 1979.

It is also noteworthy that NRC inspectors at TMI during the weeks before the accident failed to find or note the reactor coolant leak. Later, the company pleaded "no contest" to federal charges of criminal falsifications On May 22 1979, former control room operator Harold W. Hartman, Jr. tells the NRC investigators that Metropolitan Edison- General Public Utilities had been falsifying primary-coolant, leak rate data for months prior to the accident. At least two members of management were aware of the practice. NRC investigators do not follow-up or report the allegations to the commission.

On February 29, 1984, a plea bargain

between the Department of Justice and Met Ed settled the Unit 2 leak rate falsification case. Met Ed pleaded guilty to one count, and no contest to six counts of an 11 count indictment.

"In a worst-case accident, the melting of nuclear fuel would lead to a breach of the walls of the containment building and release massive quantities of radiation to the environment. But this did not occur as a result of the Three Mile Island accident."

It was only by luck that the reactor walls were not breached. The industry conjectured that voids in the coolant prevented molten fuel from burning through the reactor walls. It is not known if these voids will form to prevent a total meltdown in future accidents. Fifteen million curies of radiation is a "massive quantity."

"The accident caught federal and state authorities off-guard."

State officials had no means to measure radiation at the scene. They had to take field samples and return to their laboratories. This was not an

effective way to acquire real-time data or collect data on gaseous releases. Their data collection abilities were insufficient to determine release rates. The NRC no longer monitors radioactive releases at reactor sites.

"They did not know that the core had melted, but they immediately took steps to try to gain control of the reactor and ensure adequate cooling to the core."

Reactor core measurements taken during the first morning showed that fuel might have melted. This data was cast aside because operators believed it was not possible and therefore erroneous. During the first day, the NRC in fact distanced itself from the company by stating it did not tell them how to run their plant and that they were overseers of regulatory matters. Initially, the NRC was more interested in hiding from responsibility than offering advice to the company.

"In an atmosphere of growing uncertainty about the condition of the plant, the governor of Pennsylvania, Richard L. Thornburgh, consulted with the NRC about evacuating the population near the plant. Eventually, he and NRC Chairman Joseph Hendrie agreed that it would be prudent for those members of society most vulnerable to radiation to evacuate the area. Thornburgh announced that he was advising pregnant women and pre-school-age children within a 5-mile radius of the plant to leave the area."

The NRC's agreed-upon conditions of a reactor which would require evacuation of nearby communities had already been met two days earlier on Wednesday the 28th. Governor Thornburgh complained often about the conflicting and confusing data coming from the plant and the NRC.

"...even though it led to no deaths or injuries to plant workers or members of the nearby community."

Findings from the re-analysis of cancer incidence around Three Mile Island is consistent with the theory that radiation from the accident increased cancer in areas that were in the path of radioactive plumes. "This cancer

increase would not be expected to occur over a short time in the general population unless doses were far higher than estimated by industry and government authorities." Rather, our findings support the allegation that the people who reported rashes, hair loss, vomiting and pet deaths after the accident were exposed to high level radiation and not only suffering from emotional stress." (Dr. Steven Wing, August 1996, University of North Carolina – Chapel Hill)

"But new concerns arose by the morning of Friday, March 30. A significant release of radiation from the plant's auxiliary building, performed to relieve pressure on the primary system and avoid curtailing the flow of coolant to the core, caused a great deal of confusion and consternation."

This was not by accident or design. The release was perpetrated by a lone operator acting on his own and without permission or consultation with anyone else. There were no regulatory repercussions resulting from his actions.

"Today, the TMI-2 reactor is permanently shut down and defueled, with the reactor coolant system drained, the radioactive water decontaminated and evaporated, radioactive waste shipped off-site to an appropriate disposal site, reactor fuel and core debris shipped off-site to a Department of Energy facility, and the remainder of the site being monitored."

The reactor was destroyed. No one knows how much fuel remains in the reactor core debris. Some estimates have placed it at 20 tons of uranium. Unit #2 is still releasing small amounts of radiation to the air and water.

"The accident was caused by a combination of personnel error, design deficiencies, and component failures."

Also add to the list: criminal activity, the NRC's failure to disseminate safety data, NRC inspection and enforcement failures, failure to fix problems noted by control room operators, sloppy

control room housekeeping and economic gain placed above safety.

"Upgrading and strengthening of plant design and equipment requirements. This includes fire protection..."

A reactor safety division specifically created to spot problem trends in the wake of the TMI accident was abolished by NRC executives in 1999. For more than a decade, the NRC was aware that the fire protection material Thermolag was defective and burned at the same rate as plywood. The NRC was aware that Thermolag's manufacturer has falsified test results yet did nothing to fix the problem. Finally the NRC asked TMI to remove Thermolag. Two years after that request, TMI was again asked to remove Thermolag. The NRC and TMI were very slow to act.

"Expansion of NRC's resident inspector program - first authorized in 1977 - whereby at least two inspectors live nearby and work exclusively at each plant in the U.S to provide daily surveillance of licensee adherence to NRC regulations..."

At Davis-Besse, there was no chief inspector for a year. Inspectors find less than 2% of problems identified at the plants. The NRC has decreased total inspection man-hours in recent years.

"The installing of additional equipment by licensees to mitigate accident conditions, and monitor radiation levels and plant status..."

The NRC no longer monitors radiation at the plants. On many occasions, the communication lines from the control room computers to the NRC are found to be inoperable.

"Employment of major initiatives by licensees in early identification of important safety-related problems, and in collecting and assessing relevant data so lessons of experience can be shared and quickly acted upon..."

Oh, if this were only true. Drastic employee cutbacks and overburdened workers and engineers have little time and are reluctant to raise safety new issues. TMI Alert has learned of TMI
continued on page 14...

TMI 25TH ANNIVERSARY ANTI-NUCLEAR EVENTS

All events listed are taking place in the U.S.

March, 2004

Photo display: "The People of Three Mile Island," Harrisburg City Hall, 10 N. Market Square, Harrisburg, PA. Contact Angie McClurkin, Angmclurkin@comcast.net. Free potassium iodide pills and emergency preparedness guides available.

Monday, March 15

Sane Virginia and Blue Ridge Environmental Defense League protest actions against new nuclear reactors at the North Anna nuclear power plant near Charlottesville. Public comments will be submitted at the Louisa County Board of Supervisors meeting during its annual review of the North Anna reactors. Street theater with giant puppets is being planned. Contact Abhya Thiele with Sane Virginia at saneva@yahoo.com, and Lou Zeller with BREDL at ph. 336.982.2691, BREDL@skybest.com

Tuesday, March 23

"Remember TMI." Massachusetts Citizen Awareness Network (CAN) will show films in Greenfield, MA on March 23 at 7:00 P.M., including "TMI Revisited." There will be a discussion afterward about how people can become involved in preventing nuclear hazards. There may be a media conference. A "Mobile Chernobyl" full-size replica mock nuclear waste cask on a trailer will be deployed. Contact Deb Katz, CAN, ph. 413.339.5781, deb@nukebusters.org

Press Debriefing – all day. TMI owner AmerGen will host a press briefing and tour of TMI at 10am. Three Mile Island Alert and EFMR Monitoring Group will provide a "debriefing" all day at the EFMR office at 213 South Union Street, Middletown, PA. No reservations required. Contact EFMR, ph. 717.944.3007.

Wednesday, March 24

(tentative: this event could also take place on Thurs., March 25th or Tues., March 23rd) Congressional and media briefing, providing update on health and environmental problems in the TMI community, the U.S. Nuclear Regulatory Commission's regulatory rollbacks (including gutting fire protections at reactors), the pending "nuclear power relapse" in the energy bill before Congress, and nuclear waste deregulation threats, all in the context of precautionary actions needed to prevent nuclear hazards. Lois Gibbs of the Center for Health, Environment, and Justice will host. Featured speakers include TMI watchdog Dr. Judith Johnsrud, members of the U.S. Congress, and spokespeople from NIRS, Public Citizen Critical Mass Energy and Environment Program. Co-sponsored by Children's Environmental Health Network. Contact Diane D'Arrigo at NIRS, ph. 202.328.0002 ext. 16, dianed@nirs.org

Thursday, March 25

Noon rally on the Library Mall at the University of Wisconsin in Madison to confront UW's role in pushing nuclear power and stalling clean energy, and to mark the 25th anniversary of the TMI nuclear power plant disaster. Visit WI's Nuclear Watch Dog website, www.WNWD.org, or call Clean Wisconsin at 608.251.7020.

Susquehanna Valley Alliance, 25th Anniversary Dinner, 6 to 10 P.M., Friends Meeting House, 110 Tulane Terrace, Lancaster, PA. Contact Kip Adams, kipadams@yahoo.com
12 noon, "Forever Deadly Radioactive Waste is Not Sustainable,"

talk by Kevin Kamps of NIRS, at the Science and Theology Seminar at the Wesley Foundation in West Lafayette, IN. Later that same evening, World Pot Luck, "Crossroads and Crosswinds: Indiana in the Crosshairs of Nuclear Danger" by Kevin Kamps, also in W. Lafayette. Contact Loren Olson, loren@dcwi.com, ph.765-743-0278.

Friday, March 26

Three Mile Island-Alert Press Luncheon, Capitol Building, East Wing, Room E-60, Harrisburg, PA. Noon. Featuring David Lochbaum, Nuclear engineer, Union of Concerned Scientists, and Dr. Steve Wing, epidemiologist, University of North Carolina. Lochbaum, Wing, and Joseph Mangano, National Coordinator of the Radiation and Public Health Project, are also available for media interviews from March 25 to March 27 at the Harrisburg Marriott Hotel, 4650 Lindel Road, ph. 717.564.5511. Free potassium iodide pills and emergency preparedness guides available.

6 P.M. TMI-Alert showing of "China Syndrome" at Midtown Cinema, 250 Reily St., Harrisburg, PA. Film includes Q&A on nuclear issues, featuring: David Lochbaum, UCS; Scott Portzline, security expert, TMI-Alert; Dr. Steve Wing, UNC. Tickets \$15. Reservations on-line at www.acteva.com//booking.cfm?binid=1&bevalD=63764 or call TMI-Alert at 717.233.7897 or 717.541.1101. Free potassium iodide pills and emergency preparedness guides available.

Saturday, March 27 and Sunday, March 28

Cinemareno presents "The Atomic Film Festival" at the Nevada Museum of Art (Reno, NV), featuring the films: Plutonium Circus, The Day after Trinity, Atomic Café, On the Beach, Meltdown at Three Mile Island, The China Syndrome, Panic in Year Zero, and Dr. Strangelove. For more info., visit www.highfalutinfilms.com/cinemareno/atominfo.htm

Saturday, March 27

TMIA-Alert's TMI 25th Anniversary Community Banquet at American Legion Post #594, 137 East High Street, Middletown, PA 17057, 6 to 9 P.M. A hot buffet dinner, with speakers, open mike time for remembrances, and music. Ticket Price: \$20.00. Book your ticket on-line at www.acteva.com//booking.cfm?binid=1&bevalD=60074 or contact TMIA-Alert, ph. 717.233.7897 or 717.541.1101.

TMIA-Alert Oral History Taping, 7 to 11 P.M. Taping of personal experiences for the Dickinson Oral History Project will be conducted at the EFMR office at 213 South Union Street, Middletown, PA. No reservations required. Contact EFMR, ph. 717.944.3007.

Sunday, March 28

"TMI, Chernobyl, Who is Next?" No Nukes Pennsylvania Annual Vigil at the North Gate of Three Mile Island. Take Route 441 two miles south of Middletown, PA. Gather at 3 A.M. Sunday, March 28, 2004. Rain or snow. Speakers begin at 3:30 A.M. Moments of silence at the exact time of the accident at approximately 3:52 A.M. Individuals are encouraged to "Speak Out" until Vigil is over at first light.

Annual No Nukes Breakfast at Capitol City Diner off Route 283 at Route 441 at about 6 A.M. Bring signs, pictures, songs, etc. to the

Vigil. Bring your story for the video chronicle. Contact: Gene Stilp, Director, No Nukes Pennsylvania, 717-443-6421, genestilp@aol.com.

Salem Nuke Protest - Sunday March 28th from 2pm till 4pm at Salem Nuke Access Road, Lower Alloways Creek Township, New Jersey. Commemorate the 25th Anniversary of TMI Meltdown. Unplug Salem Now ! No TMI on the Delaware ! Speakers Include: Judith Johnsrud (TMI Alert), Paul Gunter (NIRS), David Lochbaum (UCS), Jane Nogaki (NJ Environmental Federation), Tony Totah (Clean Ocean Action), Joe Mangano (Tooth Fairy Project), Norm Cohen (UNPLUG Salem), Ray Shadis (New England Coalition on Nuclear Pollution), Frieda Berryhill (Delaware's Original Anti-Nuke Organizer), J. Roy Cannon (Delaware Green Party), Matt Ahearn (NJ Green Party), Maya Von Rossum (Delaware Riverkeeper, invited), Jim Riccio (Greenpeace, invited), PSEG Nuclear Whistleblower (invited), Jersey Shore Nuclear Watch, The Eco-Chorale (Green Party Singers). Solar Power Provided by LBI Solar. Contact Norm Cohen, ph. 609.601.8583, ncohen12@comcast.net, or visit www.unplugsalem.org/

Monday, March 29

"AVOID ANOTHER THREE MILE ISLAND." Jersey Shore Nuclear Watch afternoon meeting at Ocean County College. public meeting calling for the immediate shutdown and decommissioning of Oyster Creek in observance of the 25th Anniversary of TMI . Speaker: Ray Shadis, decommissioning expert, helped shut down the Maine Yankee on "How To Decommission Oyster Creek Nuclear Generating Station." Panel: Sidney Goodman, author of "Asleep At the Geiger Counter" and Edith Gbur, Jersey Shore Nuclear Watch. March 29, 7 to 9 P.M. Dover Township Administration Building, 101 Hooper, Toms River, NJ. Contact Edith Gbur, ph. 732.830.6565. Visit.

March 29, 30, and 31

Vermont Citizens Awareness Network, New England Coalition on Nuclear Pollution, and Nuclear-Free Vermont will hold a three day film festival, featuring "Three Mile Island Revisited" and vigil at the Vermont Yankee nuclear reactor. Contact Deb Katz, CAN, ph. 413.339.5781, deb@nukebusters.org

April to June

Art exhibition at Penn State University-Harrisburg. Call for artists: <http://www.tmia.com> <http://www.tmia.com>. Contact Angie McClurkin, [hyperlink mailto:Angmclurking@comcast.com](mailto:Angmclurking@comcast.com) Angmclurking@comcast.com or Maureen Mulligan, [hyperlink mailto:maureenm@pa.net](mailto:maureenm@pa.net) maureenm@pa.net.

Thursday, April 1

Illinois State University Student Environmental Action Coalition follows up its successful Feb. "NRC: Nuclear Reality Conference" in Bloomington-Normal with a celebration of April Fool's Day, protesting Exelon Corporation's foolish plans to build a new nuclear reactor in Clinton, IL. Contact Geoff Ower, ph. 309.454.1836, [hyperlink mailto:geoff@nukereality.org](mailto:geoff@nukereality.org) geoff@nukereality.org or Dan Moriarty, ph. 309.451.1789, [hyperlink mailto:dan@nukereality.org](mailto:dan@nukereality.org) dan@nukereality.org. Visit [hyperlink http://www.nukereality.org](http://www.nukereality.org) www.nukereality.org.

Sunday, April 18

A coalition of Long Island groups – Indian Point Safe Energy Coalition, Mid-Island Radiation Alert, and PeaceSmiths will feature speakers from near Indian Point and Three Mile Island nuclear power plants and show the film "Three Mile Island: Accident

Without End." 7 P.M., Cinema Art Centre, Huntington, Long Island. Contact Miriam Goodman, ph. 631.367.8581; Susan Blake, ph. 631.226.1595

Tentative Plans:

Contact the following for dates, times, and more details on events:

Connecticut Citizens Awareness Network, along with People's Action for Clean Energy, CT Greens, and CRC will show films. A "Mobile Chernobyl" full-size replica mock nuclear waste cask on a trailer will be deployed. Contact Deb Katz, CAN, ph. 413.339.5781, [hyperlink mailto:deb@nukebusters.org](mailto:deb@nukebusters.org) deb@nukebusters.org

Central New York Citizens Action Network will show videos and feature nuclear whistleblowers. Contact Deb Katz, CAN, ph. 413.339.5781, [hyperlink mailto:deb@nukebusters.org](mailto:deb@nukebusters.org) deb@nukebusters.org

Westchester County (New York) Citizen Awareness Network, along with Riverkeeper and NYPIRG, are tentatively planning an event regarding the Indian Point nuclear power plant. Contact Deb Katz, CAN, ph. 413.339.5781, [hyperlink mailto:deb@nukebusters.org](mailto:deb@nukebusters.org) deb@nukebusters.org or Kyle Rabin, Riverkeeper, ph. 845.424.4149 ext. 239 krabin@riverkeeper.org.

Blue Ridge Environmental Defense League is tentatively considering an event regarding the Catawba and McGuire nuclear power plants in the western Carolinas. Contact Lou Zeller with BREDL, ph. 336.982.2691, BREDL@skybest.com

NC WARN (North Carolina Waste Awareness and Reduction Network) is tentatively planning events regarding the Shearon Harris and Brunswick nuclear power plants. Contact Jim Warren at ph. 919.416.5077, jim@ncwarn.org, www.ncwarn.org

Mothers for Peace is pursuing its lawsuit against Pacific Gas and Electric's Diablo Canyon nuclear power plant and is considering a TMI accident anniversary event. Contact Rochelle Becker, beckers@thegrid.net, ph. 805.489.7420.

Citizen Alert in Las Vegas, Nevada has an event in the planning stages. They will deploy a "Mobile Chernobyl" full-size replica mock nuclear waste cask on a trailer. Contact Peggy Maze Johnson, ph. 702.796.5662, pmj1@citizenalert.org, www.citizenalert.org.

Indigenous Environmental Network has tentative plans regarding uranium mining and its member grassroots groups in the Native American environmental movement. Contact Bob Shimek, ph. 218.751.4967, rshimek@iearth.org.

Tentative (sometime between March 22 and 28) house party/letter writing party with video showing in Beloit, OH (northeast OH). Contact Lisa Bays-Herold, ph. 330.525.0388, lisah@cannet.com.

continued from page 11...

employees who simply "up and quit" due to the excessive work load.

"July 1980 approximately 43,000 curies of krypton were vented from the reactor building."

For 11 days, in June-July, 1980, Met Ed illegally vented 43,000 curies of radioactive Krypton-85 (beta and gamma; 10 year half life) and other radioactive gasses into the environment without having scrubbers in place.

In November 1980, the United States Court of Appeals for the District of Columbia ruled that the krypton venting was **illegal**. By 1993, TMI-2 evaporated 2.3 million gallons of accident generated radioactive generated water, including tritium a radioactive form of hydrogen (half life; 12.5 years), into the atmosphere despite legal objections from community-based organizations.

Postscript:

The NRC fails to point out that it had ignored for more than a year prior to the accident, a newly discovered safety problem which did occur at TMI. Voids

in the coolant created by a poor design of piping caused reactor pumps to cavitate and vibrate violently. These vibrations threatened to destroy the pumps. The coolant pumps had to be turned off during the height of the accident.

The NRC's role in the accident is one of tacit permissiveness. The attitude of the industry was criticized by the President's Commission above all other factors. Three Mile Island Alert has observed that safety conditions and attitudes are returning to the level evidenced by the industry in 1979.

Many of the so called "permanent" changes have been downgraded since the time of their installation. The NRC inspectors have little confidence in the newly implemented regulatory process according to a January 2000 GAO investigation. The new regulatory process handcuffs the ability of inspectors to pursue safety problems at the plants. Unless a suspicious condition is deemed clearly dangerous, the new process doesn't allow the implementation of other than routine inspections.

The Davis-Besse near miss is a prime example. The NRC did not have a resident inspector there for one year. Although there was clear evidence of a leaking reactor, the NRC initially denied possession of the "smoking gun" – a picture of the red crud which had formed on the outside of the reactor vessel. The NRC had in fact ignored the problem to allow the plant to continue operating; determining that something is clearly dangerous is apparently still a subjective skill at the NRC.

There are many outstanding safety issues identified by the NRC following the accident which have still not been corrected. One example is the vulnerability of electrical cables during an accident which can electrically short circuit. Another example is the PORV valve which released the coolant during the accident – it is still not rated as a "safety item."

Source and contact: Three Mile Island Alert - March 2004; The above is an excerpt of the critique, contact tmia@tmia.com for the full version

UNREALISTIC EMERGENCY PLANNING

There is no disputing that the nuclear accident at Three Mile Island caught federal and Pennsylvania officials without any civilian emergency plan. What NRC and industry had thought was an "incredible" event, did in fact, occur. Amid complaints from Pennsylvania Governor Richard Thornburg of conflicting, confusing and misleading information from both NRC and Metropolitan Edison, the utility that operated TMI, the governor's subsequent "advisory" to evacuate was scrambled together and issued three days after the accident.

(605-606.5589) NIRS - Now twenty-five years on, the picture of emergency planning for a nuclear power accident is much different. But are current plans adequate to protect populations from a catastrophic release of radiation, particularly with the newly-understood threat of terrorist attacks?

Plans for a nuclear reactor accident now outline evacuation routes and establish reception centers for those seeking radiation monitoring, decontamination and medical attention. State and local governments, with support from the Federal government and utilities, develop plans that include a radiation plume

emergency planning zone (for sheltering and evacuation) within a radius of 10 miles (18 km), and an ingestion planning zone (sheltering of cows and stored feed) within a radius of 50 miles (80 km) from the reactor.

Residents within the 10-mile emergency-planning zone (EPZ) are required to be provided with emergency information materials (via brochures, the phone book, calendars, utility bills, etc.). These materials contain information on radiation, instructions for evacuation and sheltering, special arrangements for the handicapped, contacts for additional information, etc.

However, current emergency plans for populations living and working around nuclear power stations remain unrealistic in several important aspects and are likely to fail. The fundamental flaw is that plans do not take into consideration the natural behavior of people seek to protect themselves and their families in the event of a nuclear accident.

The lessons learned from the Three Mile Island accident should provide very important experience for emergency planners to seriously consider the viability of successfully executing nuclear accident emergency plans. A study of human response in

the aftermath of TMI was published in "Evacuation Behavior In Response To Nuclear Power Plant Accidents," by Donald Zeigler and James Johnson, Jr. in the May, 1984 issue of *The Professional Geographer*.

Here are some of their findings:

1. To plan for only a 10-mile evacuation is to significantly under plan for a nuclear power station accident.

The 10-mile emergency-planning zone is a politically arbitrary distance. It has no bases in meteorology, radiation releases mechanisms and human behavior. In fact studies of human behavior following the TMI accident, where a limited evacuation advisory was issued by Governor Thornburg, provides evidence that people will spontaneously leave their homes well beyond the current 10-mile EPZ. This human behavior phenomenon has been termed the "evacuation shadow effect." The evacuation shadow is determined by people who believe themselves to be at risk and who evacuate even though they have not been ordered or advised to do so by officials. The study of human behavior around the TMI accident showed that if the government had advised only people, specifically pregnant mothers and pre-school children, within a 5 mile radius, that number would have been about 3400 evacuees.

Instead, as many as 200,000 people actually evacuated, approximately 39% of the population within 15 miles of the reactor. The "shadow" evacuation phenomenon is not expected to diminish until approximately 25 miles out from the reactor. The study found that in addition to the high rate of voluntary evacuation, those evacuees tended to travel distances much greater than has been observed in previous studies on non-nuclear related evacuation behavior (hurricanes, floods, etc.). The TMI study evidenced that the median distanced traveled by evacuees was 85 miles. The NRC commissioned a study (Flynn 1979) that evidenced an average distance of 100 miles of travel.

2. To locate all of the public shelters and reception centers immediately beyond the 10-mile EPZ is to invite chaos and failure of the plan.

Currently all shelters and reception centers for evacuees within the current planning zone are located in a 10-20 mile range from reactors. Anyone taking shelter in them will likely watch the resident population pack into their cars and head farther away. Ionizing radiation is such a dreaded invisible threat that people will want to put as much distance as possible between them and the accident site. Because of their close proximity, a significant percentage of shelter and reception center personnel are unlikely to report for duty.

3. To depend on buses to evacuate populations without cars (school children, the elderly, prison and hospital populations) is to ignore role conflicts within the emergency personnel designated as drivers and supervisors vital to successful evacuation.

Those people depended upon to drive buses are unlikely to be professional emergency workers. They may delay response as a result of role conflict between emergency duty and home. They may not respond at all and tend to their families. Social surveys of personnel with assigned emergency duties indicate the strong potential for role conflict to interfere with the management of a nuclear emergency. Research conducted in the vicinity of the now closed Shoreham nuclear power station on Long Island, NY questioned bus drivers and volunteer fireman "What do you think you would do first if an accident requiring a full scale evacuation of the population within 10 miles of the nuclear reactor were to occur?"

The results found that 68% of 291 fire fighters, 73% of the 246 bus drivers indicated that family obligations would take precedence over emergency duties. The consequence of such choice would be a failed response to the nuclear emergency.

During the TMI accident, role conflict was documented among many of the emergency workers including the exodus of physicians, nurses, and technicians required to staff both the short term and long term medical facilities. At one local hospital, only six of 70 physicians scheduled for weekend emergency duty reported for work. None of the hospitals researched in the study were in the 5 mile radius of the evacuation advisory. Other instances of role conflict include Pennsylvania National Guard and even nuclear power plant workers.

Current emergency planning guidelines for children in schools located within the EPZ for every reactor rely exclusively upon their teachers and child care providers to supervise students and children through the sheltering-in-place at a facility or an evacuation to a distant "reception center" for the duration of the emergency or until each student or child is released to an authorized adult.

Parents of these children are offered bland assurance that their children will be cared for should a radiological emergency at the nuclear power station occur. This is false and misleading assurance. No state has the statutory authority to require non-civil defense employees to participate in an emergency plan for nuclear power stations. A mandate for non-civil defense employees to participate in the event of a nuclear accident presents the unconstitutional conscription of private citizens. State authorities should be challenged on this unconstitutional practice and required to plan for the provision of appropriate civil defense personnel.

4. To package information for radiological accident emergency planning as similar to an emergency response to other disasters (i.e. hurricanes) is to ignore that there are major differences in how people respond to these very different events.

Nuclear reactor operators and emergency planners characterize nuclear disaster planning as no different than that for a hurricane or some other disaster, but the public

clearly perceives a difference of threat and consequences between a nuclear meltdown and a hurricane. Nuclear utilities, state emergency planning agencies and the NRC refuse to acknowledge these distinct differences in the actual threat, public perceptions and fears of the harm that can occur as the result of an accident on the scale of Chernobyl, and other catastrophes.

The harm derived from a nuclear accident both short term and long term includes deadly radiation sickness, cancer, birth defects and spontaneous abortions. The magnitude of public response to be greater than an evacuation from a natural disaster should be acknowledged and factored into emergency planning and exercises. Instead, nuclear power regulators, industry officials and state authorities downplay the biological impact of exposure to a radiological accident.

5. To expect to "manage" an evacuation is unrealistic.

People will manage their own evacuation response and will attempt to rescue their children and families

first. They will head out in their own cars as quickly as possible and try to get on the few available roads and will slow or halt the entire evacuation process, likely trapping the intended evacuees in traffic closer to the reactor and most immediately under any escaping radiation plume.

With nuclear power becoming increasingly uneconomical, emergency planning is likely to come under increased scrutiny and the budgetary knife of the NRC and the nuclear industry to further reduce "unnecessary regulatory burden" and the associated costs to a deregulated electric industry.

Regulations governing the establishment of the 10 mile radius have already been targeted by industry to be reduced to 5 miles under justification that revised estimates of the "source term," or the amount of radiation likely to be released in a catastrophic accident, are much less. One utility figured a 75% saving in reduced emergency siren maintenance costs and public information distribution. There is also the ongoing

industry effort to minimize the appearance of a threat from nuclear power to the public eye.

The industry and regulatory changes do little to build public confidence in the intent and sincerity of efforts to first provide for the health and safety of large populations living in the shadow of an aging and increasingly dangerous nuclear power industry. In fact, profit driven changes or attempts to minimize the impact of a radiological accident further erode public confidence in emergency planning as well as the planning authorities.

Regardless of the federal regulations, local and state authorities have the power to realistically plan for emergency in case of catastrophic nuclear accidents. The first step in that process is to demand answers to these outstanding questions and many others. Officials must also oppose unrealistic economically-driven changes to already faulted planning.

Contact: Paul Gunter at NIRS

MOBILE MELTDOWN - TMI TRAIN TROUBLES

TMI-Unit 2 became operable in March 1978 but due to numerous problems and shutdowns, the reactor had operated effectively for just three months prior to the accident. During the accident, the relatively new fuel came within half an hour of melting through the reactor vessel, the precursor for the proverbial "China syndrome," in which the fuel would burn its way down to the underground water table, causing massive radioactive steam discharges in the environment.

(605-606.5590) NIRS - Five years after its meltdown, the reactor vessel head from TMI-2 was removed and between 1985 and 1990, the reactor was partially "defueled." A portion of the fuel that had melted then turned into a hardened mass was chopped out of the reactor vessel, to be shipped off to Idaho for "interim" storage. At one point, the workers responsible for removing the fuel had to stop because they could not see through the vessel coolant water. A population explosion of mutant microorganisms ("algae, fungi, bacteria, and aerobic and anaerobic organisms") was apparently

thriving in the highly radioactive water, making it opaque and clogging up the filters. After trying various unsuccessful and unsafe biocide concoctions, massive infusions of hydrogen peroxide finally restored visibility. (1)

It should be noted that not all the irradiated nuclear fuel was removed from the destroyed TMI core. In August 1993, Dr. Michio Kaku, professor of Nuclear Physics, City University of New York, evaluated studies conducted or commissioned by GPU [General Public Utilities, then-

owner of the TMI plant] and the NRC on the amount of fuel left in TMI-2. "It appears that every few months, since 1990, a new estimate is made of core debris, often with little relationship to the previous estimate..." Dr. Kaku concluded. "...[E]stimates range from 608.8 kg to 1,322 kg [1,342 pounds to 2,915 pounds]... This is rather unsettling... The still unanswered questions are therefore: precisely how much uranium is left in the core, and how much uranium can collect in the bottom of the reactor to initiate re-criticality." (2)

Eric Epstein of TMI-Alert told the authors of *Critical Hour* (see book review) that as of 2003, no more was known about the quantity of fissile debris remaining in the core. The utility says it will keep the facility in long-term, monitored storage until the operating license for the TMI-1 reactor expires, at which time both reactors will be decommissioned. However, the expiration date of 2014 could be extended until 2034 if Exelon applies for what has become a near automatic license extension from the U.S. Nuclear Regulatory Commission (NRC). (3)

The removed portion of the severely damaged nuclear fuel was transported by train to the Department of Energy's (DOE) Idaho National Engineering Lab. (INEL) and between 1986 and 1990, at least 22 separate shipments were conducted through states between Pennsylvania and Idaho. All passed through St. Louis, Missouri. The two dozen shipments involved not only broken fuel rods, but also broken promises, speed limits and safety requests that bode ill for the nuclear establishment's Yucca Mountain dump scheme.

The DOE was in charge of these TMI-2 fuel debris shipments, just as it would be in charge of the Yucca Mountain shipments. DOE and the train companies hired to haul the high-level radioactive waste (HLRW) casks to Idaho were asked by the City of St. Louis not to exceed 35 miles (56 km) per hour, however, TMI-2 shipments were observed traveling at 65 (105 km) mph. A promise was made to St. Louis area officials that TMI-2 trains would not pass through the metropolitan area during rush hour, but this agreement was also violated. (4)

DOE continues to violate agreements with Missouri to date. In June 2001, three truckloads of irradiated fuel from a German research reactor enroute from South Carolina to Idaho passed through Missouri population centers during rush hour, and pulled over at an unauthorized location during a fierce rainstorm, again contrary to prior agreements. (5)

The federal Environmental Assessment for the TMI-2 shipments had assumed only one high-level radioactive waste cask per train shipment. The "Finding of No Significant Impact" equaled a green light for the shipments to proceed and indeed, the very first shipment, which passed through St. Louis on July 22, 1986 carried only one cask. Though just over two months later the second shipment carried two casks, an unanalyzed condition that was repeated numerous times by shipments carrying two and sometimes three casks.

St. Louis officials responsible for public safety were not happy to see flammable calcium carbide cars mixed in with melted down HLRW from TMI!

The shipping casks themselves also posed problems, during both design and fabrication. For example, residual water was unavoidably entrapped in the shipping canisters during fuel loading. The release of hydrogen and oxygen gases caused by the exposure of the water molecules to radioactive particles and rays emitted by the fuel, known as radiolysis meant "recombiner catalysts" had to be installed in each fuel canister to combine the gases back into water, in an effort to reduce the generation of combustible gas mixtures. Some of the canisters were also found to have defective O-rings – the type of seal blamed for the 1986 Challenger space shuttle disaster. (4)

Borated neutron-moderators had to be included in the canisters to protect against a criticality accident. Such precautions against inadvertent chain reactions in the still-fissile HLRW are necessary in most shipping containers, although the amount of borated neutron moderators required should vary with the quantity, age, enrichment level, history and condition of the irradiated fuel.

Perhaps the most dramatic accident involving TMI-2 meltdown shipments

took place on 24 March, 1987 when the train, carrying two HLRW casks, collided with a car that had stalled on the tracks in St. Louis. (4)

The fourteenth shipment through St. Louis, on Feb. 9, 1988 caused another type of anxiety among city officials and emergency responders. The train carried three HLRW casks, separated by "buffer" cars. According to a city official who spoke on condition of anonymity (4), two buffer cars were marked with hazardous materials placards declaring that they contained calcium carbide. Calcium carbide is an unstable chemical that reacts violently with water, generating a highly flammable gas. In case of a fire involving calcium carbide, water must not be used. In addition to being incompatible with moisture and water, calcium carbide must be kept away from strong oxidizing agents, hydrogen chloride, and magnesium. (6) Needless to say, St. Louis officials responsible for public safety were not happy to see flammable calcium carbide cars mixed in with melted down HLRW from TMI!

The officials investigated the buffer cars while the train was stopped in a rail yard in East St. Louis, Illinois. According to some accounts, the substance in the buffer cars turned out to be crushed limestone. Was the buffer car mistakenly marked? Regardless of whether the buffer cars were empty, contained limestone, or actually contained calcium carbide, their placards would have stopped firefighters from using water to douse flames in the event of a fire involving the shipment. HLRW casks are only designed to withstand low temperature fire (1,475 degree Fahrenheit, 800 degrees Celsius) for 30 minutes. Such labeling mistakes could interfere with emergency response, risking harmful radioactive releases.

More frightening still, U.S. federal regulations allow HLRW to be shipped by trains carrying mixed freight and could be located between explosives and flammables on a train. For years, DOE – apparently in a bid to save money – has strongly resisted calls by

the American Association of Railroads, environmental and public safety groups, and concerned state and local governments to only ship HLRW on dedicated trains. The highways and waterways across the U.S. are also mixing bowls for hazardous, flammable, and explosive shipments that could potentially breach HLRW transport containers in a severe accident.

Another scare was caused by the sixteenth TMI fuel debris shipment, on 24 May, 1988. During a transfer between the Conrail and the Union Pacific train lines, after the Conrail locomotive had been disconnected, the rest of the train – TMI-2 waste casks, buffer cars, and caboose – rolled about 600 feet (180 meters) before a railway worker could run after it, jump aboard, and hand-crank a wheel on top of the train to engage the brakes. (4)

How much radioactivity was contained in these two dozen shipments through St. Louis? The nuclear firm EG&G estimated the radioactivity content at over three million curies. Compare that to the total of two curies of radioactivity used at one time at the world-class Washington University medical center in its thousand labs that use radioisotopes for research! (4)

A secret DOE train shipment carried two casks of damaged fuel rods across the U.S. in July 2003. (7) The shipment originated at the shutdown commercial irradiated-fuel reprocessing facility at West Valley, New York. It very likely traveled through states from Pennsylvania to Idaho (8) before the casks ended up at INEL. There the waste, originally from the Big Rock Point reactor in Michigan and the Ginna reactor in New York, was placed in "interim" outdoor dry-cask storage.

This shipment closely followed the route traveled by the two dozen TMI fuel debris shipments over a decade earlier, with an important exception: it apparently bypassed St. Louis to the north, entering Missouri at Hannibal and exiting at Kansas City. (8) Both the TMI shipments and the West Valley shipment avoided traveling through Chicago. In fact, DOE explicitly stated

it had chosen the West Valley shipment route based in large part on "population along the route and potential risk to the public." (9) DOE's Yucca Mountain transport plan does not mandate the avoidance of major population centers. Originally scheduled to roll in October 2001, the shipment was delayed almost two years due to concerns over terrorism (10).

In addition, the DOE and NRC agreed that the casks, with uncertified seals, were not to travel between 31 October and 1 April in order to avoid extreme cold weather conditions. (11) In fact, St. Louis would experience one to two truck shipments per day, or two to three train casks per week, on average, for three decades. (12) Rail yards just off downtown Chicago would be subjected to one train cask out of every three train casks bound for Yucca. (13)

According to the NRC, the TMI-2 irradiated fuel debris shipped across the continent is currently stored in dry casks at DOE's Idaho National Lab (14).

Given the problems experienced by the two dozen TMI-2 shipments passing through St. Louis, it is frightening to think about the broad range of potential mishaps that could occur if the DOE were to ship many tens of thousands of HLRW casks across the nation to Yucca Mountain. We all need to work to stop this radioactive Russian roulette on the roads and rails before it begins.

Contact: Kevin Kamps at NIRS and Kay Drey on +1 314.725.7676.

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- (1) U.S. NRC, NUREG-0090, Appendix B, "Update of Previously Reported Abnormal Occurrences," update to Vol. 8, No. 4, as of April 20, 1986, pgs. 41-42.
- (2) Michio Kaku quoted in "Three Mile Island at Nineteen," April 3, 1998, Eric Epstein, Three Mile Island Alert, Harrisburg, PA. See: www.dep.state.pa.us/dep/PA_Env-Her/tmi/tmiEpstein.htm
- (3) www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html accessed March 4, 2004.
- (4) Interviews with Kay Drey in University City, Missouri March 2004.
- (5) Bill Bell, Jr., "Holden Says Radioactive

Shipment Was Bungled: Governor Charges That Federal Agency Broke Promises on Moving Wastes," St. Louis Post-Dispatch, Nov. 1, 2001.

(6) According to the Physical and Theoretical Chemistry Laboratory at Oxford University, www.physchem.ox.ac.uk/MSDS/CA/calcium_carbide.html, accessed March 4, 2004.

(7) "Public Interest Groups Criticize Handling of Recent Nuclear Waste Shipment from Western New York to Idaho: Secret Nuclear Shipment Endangered Local Communities," Public Citizen Critical Mass Energy and Environment Program press release, Aug. 11, 2003, www.citizen.org/pressroom/release.cfm?ID=1523

(8) "U.S. Department of Energy West Valley Nuclear Fuel Shipment Routes 12A & 12B," in "West Valley Spent Nuclear Fuel Shipment: Resource Guide," published by Westinghouse West Valley Nuclear Services Company and INEEL Bechtel BWXT Idaho, LLC, for U.S. DOE, undated but mailed to NIRS spring 2001, page 21.

(9) "DOE FACT: West Valley Spent Nuclear Fuel Shipment Route," a fact sheet, undated but downloaded from www.wvnsco.com/Fuel_Ship_Route.htm on Feb. 8, 2001.

(10) "U.S. Dept. of Energy Suspends Atomic Waste Train Due to Terrorist Threat," NIRS press release, Oct. 26, 2001.

(11) NRC Safety Evaluation Reports for the two casks (Docket Nos. 71-9202 and – 9206, Revision No. 7), March 19, 2001; personal communication with John Chamberlain, West Valley Nuclear Services/Demonstration Project, New York, July 9, 2001.

(12) DOE Yucca Mt. Final Environmental Impact Statement, Feb. 2002, pgs. J-173 and 174.

(13) Robert Halstead, Nuclear Waste Transport Consultant to State of Nevada Spent Fuel Project office, on CBS "60 Minutes," Oct. 26, 2003. See additional Halstead analyses at www.state.nv.us/nucwaste/trans.htm

(14) www.nrc.gov/waste/spent-fuel-storage/locations.html, accessed March 4, 2004.

TMI'S INTERNATIONAL IMPACT

In the days, weeks and months following the accident at Three Mile Island, the world witnessed unprecedented protests against nuclear power. Tens of thousands of people demonstrated in countries across western Europe, Japan and Australia as well as in the United States, where up to 120,000 people protested in Washington DC – the largest protest in the U.S. since Vietnam. Before TMI, a large portion of the public had viewed anti-nuclear protesters as over-anxious extremists according to pro-nuclear propaganda. Afterwards, many joined the movement to oppose what they had come to recognize as a clear and present danger.

(605-606.5591) WISE Amsterdam – There were of course accidents, and "incidents", at nuclear power plants before the Harrisburg meltdown but a conspiracy of silence had always surrounded earlier events.

Information concerning the real risks of nuclear power generation was rigorously censored – nuclear power had been mostly successfully packaged as the savior that would rescue us from the clutches of the oil-rich and cash-hungry nations holding the energy resource poor West to ransom. The ambitious nuclear programs would, the industry claimed, break dependence on imported oil once and for all.

Nuclear energy had been purported by many, including U.S. President Carter as the "last resort" to source the growing energy demands of the world's population. After World War II, scientists had claimed that nuclear energy would fuel everything from aircraft, lorries and ships in addition to being the main source of cheap, readily available domestic fuel.

In the desperate search for energy alternatives, governments rushed to the nuclear option taking little note of cautionary voices. Both governments and the industry claimed that nuclear fuel was clean, cheap and safe – that the public had nothing to worry about; until it did...

The cause and extent of the Harrisburg accident was and still is hotly debated. Several of the articles earlier in this newsletter have detailed the truths and myths surrounding TMI but 25 years after, there is still no true consensus – except amongst the like-minded. Nuclear proponents argue at every

opportunity that despite the severity of the event, the accident had been successfully contained which proved that safety measures did work.

Protective systems were said to have functioned as they should and had it not been for those pesky human operators... In their cataract-clouded eyes, and according to their dubious calculations, the damage to the environment and human beings was minimal and any reports to the contrary were plain scare mongering.

Despite the assurances, there was a huge wave of suspicion and dissatisfaction, people were awakening to the fact that they had been misled and misinformed and turned to the anti-nuclear movement for answers. Environmental organizations were able to voice opposition at a much higher pitch and with more supporters as people rightly began to question the word of their governments.

Dwindling public confidence was becoming a serious threat to nuclear

INES

The International Nuclear Event Scale (INES) was developed by the IAEA and OECD in 1990 to standardize the reporting of nuclear incidents and accidents and communicate them to the public. The scale starts at zero for no safety significance to goes up to 7 for a "major accident", like Chernobyl. TMI was rated at 5, an accident with off-site risks though of no harm to human life – this point of course is debatable especially given the evidence contained in this newsletter. www.uic.com

Nuclear Safety Convention

The first international legal instrument on the safety of nuclear power plants worldwide came into force in 1996. Participating countries are committed to maintaining a high level of safety by subscribing to and reporting against set international benchmarks. www.uic.com

Defense in Depth

A concept based on several levels of protection based on the introduction of successive barriers preventing the dispersal of radioactive material in the environment (so-called multi-barriers concept). There are two levels of protection: prevention – protection of the barriers by averting damage to the facilities and barriers themselves; and correction – additional measures to protect the environment should successive barriers prove ineffective. www.avn.be/uk/4_nucleaire/did_fr.asp

Globalized co-ordination on nuclear safety issues

This is based on the idea that "an accident anywhere is an accident everywhere". The importance of global information networks for sharing operational expertise; international peer reviews to identify 'best practice' to help all countries raise operational standards; and the candid dissemination of lessons learnt when problems are discovered. www.iaea.org

FURTHER READING AT WISE WEBSITE

In the *WISE/NIRS Nuclear Monitor* (and formerly the *WISE News Communique*) we reported news about the aftermath of the TMI disaster on several occasions. An introduction to the most important articles can be found in this box. You can read the articles by visiting our website at www.antenna.nl/wise and find the relevant issue through "newsletter" in the menu.

WISE Bulletin 5 (May/June 1979): Harrisburg accident sets off chain reaction around the world

An overview of actions in several countries, following the TMI disaster, where tens of thousands of people gathered to demonstrate.

WISE News Communique 467 (28 February 1997): Study reexamines 1979 TMI accident cancer

A review by NIRS of the 1997 study by Steve Wing, published in the *Environmental Health Perspective*. He conducted a reevaluation of the Columbia University Three Mile Island study, often cited as evidence that the accident caused no ill effects. Wing discovered that people living closer to the path of the escaping radiation cloud developed all cancer types more frequently, especially lung cancer and leukemia.

WISE News Communique 488 (13 March 1998): Investigators suspected sabotage at TMI

Scott Portzline reports that sabotage might have been a possible cause of the accident. He draws his conclusions based on 30,000 pages of documents at the National Archives and NRC. The accident started when valves in a condensor system closed - the reason remains unknown. The analysis by Portzline concludes that sabotage could never be excluded.

WISE News Communique 507 (26 March 1999): Twenty years of problems at TMI

Written by Three Mile Island Alert, an overview of 20 years of problems at TMI. On the costs of the cleanup and incidents during decommissioning work.

WISE News Communique 538 (10 November 2000): 21 Years later, government denies Three Mile Island accident was extraordinary

Twenty-one years (!) after Public Citizen petitioned the federal government to declare the accident at TMI an extraordinary nuclear occurrence, the agency finally responded. According to the NRC, the meltdown was not extraordinary. The NRC denied substantial personal damage, which is the criteria for an extraordinary occurrence.

WISE News Communique 554 (21 September 2001): U.S. attacks: the Three Mile Island connection

The World Trade Center was the target of a terrorist bombing in 1993, by a group that trained near TMI. According to Three Mile Island Alert, there is evidence that the terrorists trained only 30 miles (50 km) from TMI, where they practiced night time mock assaults on an electrical power substation. Four days after the bombing, the *New York Times* received a letter, subsequently authenticated by federal authorities, in which the terrorists threatened to attack additional targets including "nuclear targets" with "150 suicide soldiers".

WISE/NIRS Nuclear Monitor 567 (8 November 2002): Science for sale: TMI and the University of Pittsburgh

Eric Epstein (TMI Alert and EFMR Monitoring Group) criticizes a University of Pittsburgh study, which suggests no increased cancer rates around TMI. He concludes that the Pittsburgh study was based on old and inaccurate health surveys in the 1980s, basically funded by the industry.

growth and in 1981, the head of the International Energy Agency, Dr. Ulf Lantzke argued that an international program of action was required to restore the image of the nuclear industry.

Waning public support was not the only barrier to growth however. Climbing construction costs and high interest rates also played a part in increasing the difficulties faced by the utilities. The false claims of economical nuclear power were slowly becoming more evident as opponents gained more access to information and learnt how to share it with the public.

In the direct aftermath of the accident, nuclear countries – especially those using U.S. style reactors – rushed their nuclear experts to Pennsylvania to study the causes of the accident and plan reviews of their own programs in an attempt to prevent such an event in their own countries.

There were some minor concessions to the anti-nuclear movement with Germany leading the way by "postponing" plans for a reprocessing plant at Gorleben. The Dutch government also postponed a waste disposal scheme while in the U.S., Babcock & Wilcox (makers of the TMI reactors) plants were closed.

Despite these initial concessions some governments were not in the least deterred from their chosen nuclear path. France for one, was not for turning. Its officials assured the country that an accident such as that at TMI could not occur in France because automatic controls and cooling systems were completely different to those at TMI. Japan also refused to make any immediate changes in its energy policy but promised to increase safety measures and revise and reinforce systems as required.

Some political resistance against nuclear in view of TMI did emerge and in Spain, socialist and communist parties called for a nuclear moratorium while in Belgium the mayor of the town Huy, ordered the immediate shutdown of the Tihange

PWR that had experienced two accidents in 1978 – the decision was later overturned by ministerial order.

In Sweden, political opposition led by the former Prime Minister, Tor Bjorn Falldin, who had resigned in 1978 in a dispute over the country's nuclear program, demanded the government close down Ringhals-2 reactor – the same reactor type as TMI. The Danish parliament also debated the question as some 25,000 of its people protested against two Barsebäck reactors in Sweden, some 20 km from Copenhagen.

Investigations following the accident led to a focus on the human factors involved in the operation of nuclear power plants. Previous insistence that nuclear was perfectly safe had contributed to lax safety by operators and those investigating the accident considered this the most important factor in ensuring no repetition of such an event.

Mostly attributed to mechanical failure and human error, one of the main outcomes of the meltdown was that no major design changes were required for western reactors but that controls and implementation of operator training were to be overhauled and improved.

Twenty-five years on from the world's first significant meltdown accident in a nuclear power plant, we still live under a nuclear cloud. The nuclear industry is again beating the "revival/renaissance" drum and again, we are watching as governments continue to encourage the dangerous view that nuclear is our best option for energy generation.

Despite all the documented evidence regarding the enormous and unrecoverable costs of nuclear power not to mention the risks – proliferation, health and the environment – the political will for change is still not there.

Finland has become the first western European country in at least a decade to order a new reactor while France,

the UK and U.S. are also believed to be considering new reactor projects. The ill-advised South African government is moving towards building the untried pebble-bed modular reactor (PBMR) and in East Asia, plant construction sites are growing rapidly.

If the lessons of accidents such as TMI and Chernobyl are ever to be learnt, those who still remember the horror of those accidents must continue to talk, shout, teach and cajole the unknowing to our point of view.

Anniversaries such as this will undoubtedly bring sorrow to the victims and survivors but they must always be used to remind those with television commercial-length memories of the true horrors of nuclear in all its forms in the hope that one day soon, we will be able to convince governments to stop putting our lives at peril.

Sources:

The Telegraph Journal, 2 & 5 April 1979; *Financial Times*, 19 April 1979; *WISE Bulletin* May/June 1979; *Financial Times*, 4 February 1981; *Financial Times*, 13 June 2001; IEEE Spectrum, November 2001; www.nei.org, March 2004; Uranium Information Center, November 2003; IAEA, 14 October 2003; www.bellona.org, 22 September 2003

Contact: WISE Amsterdam

WEBSITES ON TMI

The following list consists of websites with more information and stories on TMI. The list includes both anti-nuclear and governmental/industry websites.

www.besafenet.com/nuclear.htm.

BE SAFE precautionary campaign is a coalition of national, state and local groups (including NIRS) organizing educational events from March 22nd to 28th to commemorate the disaster and to call for actions to prevent nuclear hazards.

www.tmia.com. The probably most extensive website in the 1979 disaster by Three Mile Island Alert. Contains detailed information about the first days of the event, the history of safety problems at TMI, pictures of deformed plants and animals.

www.efmr.org. The EFMR Monitoring Network is an independent radiation monitoring group near TMI and the Peach Bottom NPP. The network is comprised of citizens whom each record five radiation measurements per day.

www.tmi-cmn.org. The website of Three Mile Island Citizen Monitoring Network, a local grassroots organization. The system uses 30 remote

stations to monitor radiation levels around TMI.

www.ucsusa.org/clean_energy/nuclear_safety/page.cfm?pageID=183. An analysis by the Union of Concerned Scientists (UCS) on the lessons learned from the safety point of view, but also that some of the lessons were ignored or forgotten.

www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html. The U.S. Nuclear Regulatory Commission's fact sheet on TMI (which was criticized elsewhere in this *Monitor*). Includes a diagram of the plant's systems that were involved in the events.

www.world-nuclear.org/info/inf36.htm. Information by the World Nuclear Association.

www.nei.org/doc.asp?catnum=3&catid=294. Fact sheet by the U.S. Nuclear Energy Institute (NEI).

IN BRIEF

Kyrgyzstan bans German waste.

Kyrgyzstan will not allow waste uranium imports from Germany, Prime Minister Nikolay Tanayev said on 26 February. The government will not permit the imports because it does not want to see the country turned into a uranium waste dump. However, local media reported the uranium refinery in Kara-Balta had signed a contract with Germany's RWE Nukem GmbH to process 1,800 tons of uranium scrap waste from fuel fabrication. The refinery will result in 40 to 60 tons of natural uranium, keep the remaining waste in the refinery's tailing storage facility and will earn a profit of about US\$600,000.

Washington Times (United Press International), 26 February 2004; NuclearFuel, 1 March 2004

Nirex says radioactive waste clean up is blocked.

The U.K. nuclear industry and the Department of Trade and Industry have been accused by Nirex of trying to sabotage government waste policy. In July 2003, the Secretary of the Environment announced that the nuclear waste body, Nirex, would be independent of the nuclear industry. Details would be released by the autumn but have failed to appear. Civil servants claimed the problem was partly caused by a GBP500 million (US\$ 940 million) loan Nirex was said to owe the nuclear industry, along with GBP300 million in unpaid interest. Both sums had been written off but, Nirex blames state-owned BNFL, British Energy and the Department of Trade and Industry for the delay.

Independent, 29 February 2004

UK Cumbria County Council fights nuclear waste plan.

Cumbria County Council is fighting a proposal by the United Kingdom Atomic Energy Authority (UKAEA) to transport nuclear waste from Dounreay to be stored in Cumbria. It would mean low level waste would be brought from Dounreay to be stored at Sellafield and Drigg in Cumbria. The council has issued a formal objection to the plans

which is being supported by all political groups. The council says it believes the waste generated at Dounreay should be stored there.

BBC News, 3 March 2004

Czech Republic halts research at waste repository candidates.

Exploration work at six candidate sites for high level waste disposal has been halted for five years due to local resistance. It is expected that the government will now develop a new policy, including negotiations with the communities for financial compensation if they are willing to host a disposal site. In April 2003, the six sites were identified for further exploration.

NuclearFuel, 1 March 2004

French government accused of lacking nuclear crisis plan.

The French government is under pressure to work out a crisis plan for coping with a nuclear accident or attack on trucks carrying plutonium after accusations that it is unprepared. State-run reprocessing firm Cogema dismissed criticisms contained in two reports released early March, which questioned the safety of convoys that regularly carry plutonium. The reports were released by France's Nuclear Safety Authority (ASN) and Greenpeace. According to Greenpeace, trucks carrying plutonium pass near France's biggest two cities, Paris and Lyon.

Reuters, 5 March 2004

Germans try to buy nuclear plant.

More than 2,500 people who oppose the planned sale of a mothballed MOX fuel plant at Hanau have raised Euro 250,000 (US\$315,000) in a campaign to outbid the estimated price the Chinese government has offered Siemens for the plant. The campaign, which is being organized by the International Physicians for the Prevention of Nuclear War, is seeking to raise Euro 50 million (US\$ 63 million) plus one Euro. The group, which includes a number of prominent German singers and actors, said it would destroy the

plant if it managed to stop the export.

Frankfurter Allgemeine Zeitung, 5 March 2004

Germany: transport of spent fuel to Ahaus planned.

The German government is planning to bring 951 spent fuel elements from the Rossendorf research center (state of Saxony in former GDR) to the interim storage of Ahaus in the state of Rhine-Westphalia. The state of Saxony applied for a transport license in 1996, but the federal government had taken no action. Facing a legal threat, environment minister Juergen Trittin worked behind the scenes for months to prepare the transport. The plan has raised much resistance. Rhine-Westphalia Greens and Social Democrats (governing parties) have pressed Trittin not to license the transport. Anti-nuclear groups argue that under the 2000 phase out agreement, transports would be halted and on-site storage obligated. They fear that once Rossendorf has sent its 18 casks, many other research reactors will follow. Last transport to Ahaus, in March 1998, raised massive protests (see *WISE News Communiqué* 489.4851: "X-Days in Ahaus").

Nucleonics Week, 4 March 2004; Laka Foundation, 10 March 2004

Libyan uranium transported to Russia.

The IAEA assisted Libyan authorities on 8 March with the removal of highly enriched uranium (HEU) stored at a research reactor facility near Tripoli. The HEU, 80% enriched and in the form of fresh fuel, contains about 13 kg of fissile uranium-235. It was airlifted from Libya to Russia. Russia, the original supplier in the 1980s for the 10 MW reactor at the Tajoura Nuclear Research Center, agreed to take back the HEU and intends to blend it down into low-enriched uranium. The U.S. Department of Energy funded the US\$ 700,000 fuel-removal under a co-operative US-Russia-IAEA program called the Tripartite Initiative.

IAEA press release, 8 March 2004

Art exhibition dedicates itself to stopping Chernobyl from happening again. The Shchusev Architecture Museum in Moscow is hosting the exhibition 4th Block International Triennale of Ecological Posters and Graphics. The exposition is named after the reactor of Chernobyl that suffered a disaster in 1986 and was first launched in 1991 by Oleg Veklenko. He was sent to the nuclear plant in 1986 for clean up work and was the only artist among his brigade of cleanup workers and began to translate his experiences into visual art. His 4th Block exposition contains art made by over 300 artists from 46 different countries. Veklenko, aged 53, still suffers from chronic health problems including thyroid cancer. The exhibition can be seen in Moscow until 14 April 2004.
Moscow Times, 27 February 2004

Chernobyl Heart wins Oscar. The Chernobyl Children's Projects', Chernobyl Heart has won the Oscar for Best Short Documentary at the 2004 Academy Awards ceremony held in Los Angeles. The documentary shot over two years in the affected regions documents the horrific effects of radiation, high levels of cancer, birth defects and heart conditions suffered by the children of the region. The film was made in an effort to raise awareness of the continuing effects of the disaster and the plight of the victims and survivors and is expected to be aired shortly on the US cable television network HBO.
Chernobyl Children's Project news release, 1 March 2004; CCPI press release, 3 March 2004

Israel to keep watch on Vanunu.
Israeli PM Sharon agreed not to put

Mordechai Vanunu under administrative arrest when he is released in April, but the state will use unspecified "supervisory means" to keep watch over him. Administrative detention (house arrest) would probably be rejected in a court case. The Israeli government is afraid that Vanunu will release more details about Israel's nuclear weapons program once he is freed. To 'solve' this problem, security services are now allowed to "employ what are deemed appropriate measures" to supervise Vanunu. It is likely that he will be closely tracked and detained if he commits any security offenses.
Nucleonics Week, 4 March 2004

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THE NUCLEAR MONITOR

The Nuclear Information & Resource Service was founded in 1978 and is based in Washington, DC. The World Information Service on Energy was set up the same year and is housed in Amsterdam, Netherlands. NIRS and WISE Amsterdam joined forces in 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy.

The *Nuclear Monitor* publishes international information in English 20 times a year. A Spanish translation of this newsletter is available on the WISE Amsterdam website (www.antenna.nl/wise/esp). A Russian version is published by WISE Russia and a Ukrainian version is published by WISE Ukraine (available at www.nirs.org). The *Nuclear Monitor* can be obtained both on paper and in an email version (pdf format). Back issues are available through the WISE Amsterdam homepage: www.antenna.nl/wise and at www.nirs.org.

Receiving the Nuclear Monitor

US and Canadian readers should contact NIRS for details of how to receive the *Nuclear Monitor* (address see page 11). Subscriptions are \$35/yr for individuals and \$250/year for institutions. Others receive the *Nuclear Monitor* through WISE Amsterdam.

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Fund for a Nuclear-Free World

NIRS is delighted to welcome activist and Hollywood legend **Ed Asner** as the Honorary Chairman of our new fundraising/development campaign, the Fund For A Nuclear-Free World/NIRS-WISE. Ed will be speaking on behalf of NIRS/WISE at a dinner to kick off the campaign in Washington, DC, on April 15. We greatly appreciate Ed's help and guidance in pursuing this very necessary effort. And we'll be letting you know much more about it—and how you can help—in the weeks and months to come.

The Nuclear Monitor

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