OREGON DEPARTMENT OF ENERGY

HANFORD CLEANUP
The First 25 Years

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Hanford Cleanup: *The First 25 Years*

In February 1992, Westinghouse Hanford President Tom Anderson warned Hanford Site workers that mere cleanup was not enough to maintain continued funding. "No way is the government going to keep spending billions and billions at Hanford over so many years just to clean up some desert land. The government doesn't have a history of sticking with something that long."

Construction of a burial ground in Hanford's 200 West Area.

More than 20 years and about $40 billion later, we're fortunate that the government has stuck with it that long. And in some ways — as absurd as it may sound — that's just the beginning. The U.S. Department of Energy (DOE), which owns and operates Hanford, predicts the cleanup to run through the year 2060, with a remaining estimated cleanup cost of $113.6 billion.

The 586 square mile Hanford Site in southeastern Washington was home to the world's first plutonium production facilities. For more than 40 years at Hanford, the federal government produced plutonium for America's nuclear weapons program. The processes generated tremendous amounts of radioactive and chemically hazardous waste. Plutonium production ended at Hanford in 1988. Since 1989, the focus has been on environmental cleanup.

Throughout the past 25 years, the Oregon Department of Energy has chronicled the Hanford cleanup. This is the fourth iteration of this document. We looked back at the first 10 years of Hanford cleanup; the first 15 years; and the first 20 years. Now, we're at 25 years.

By looking back at these previous reports, we can see how the focus has changed as time has gone by and the cleanup has progressed. Two constant themes, however, are the lack of progress with tank waste treatment and concerns about funding.

From the 10 Year Report, August 1999:

The original milestones in the TPA were ambitious — too much so in many cases, and did not sufficiently reflect the complexity and challenges that exist at Hanford.

The early years of Hanford cleanup were marked by frustration, false starts, a lack of enthusiasm over the cleanup mission, and environmental laws which required extensive study and planning before cleanup could occur. Much attention was occupied by concerns about tank safety issues and trying to understand the potential for a tank fire or explosion.

DOE and its prime contractor at the time, Westinghouse, had no shortage of "partners" willing to advise them on cleanup. Regulators, Congress, other DOE programs, Native American tribes, the State of Oregon, activist groups, and many others, freely shared their oftentimes conflicting opinions about how DOE should proceed with cleanup.

After this very slow start, cleanup is now well underway and there are many successes. Unfortunately, much remains to be done. The biggest concern is that after ten years of cleanup, we have seen little progress towards removing Hanford's most dangerous wastes from aging underground storage tanks. More than 50 million gallons of high-level radioactive waste remain in these tanks, at least 67 of which have leaked. Now, these tanks are ten years older. In the past two years we've also seen confirmation that leaked tank waste has reached groundwater — showing that time isn't on our side.

During the past ten years we've seen a tremendous increase in the public's interest, involvement and advocacy on behalf of Hanford. We've seen the creation of the Hanford Advisory Board and considerable progress in citizen involvement through

this forum and others. We've also seen, in the past year or two, a divisiveness — primarily over future missions at Hanford — that threatens to tear apart this delicate and diverse coalition of interests.

The Tri-Party Agreement repeatedly came under attack and has so far survived the scrutiny of Congressional leaders. The regulators have been willing to adjust the cleanup schedule as necessary. Although the schedule in the TPA has been moved back by ten years to 2028, it's clear that cleanup will take far longer than that.

We've seen four Secretaries of Energy, three Site Managers (plus several interim or acting Managers) and more five and 10 year cleanup plans than anyone can keep straight.

The Hanford cleanup has involved and engaged many people, beginning with the thousands of Hanford workers, many of whom risked their health and their lives while working in extremely hazardous conditions. Hanford cleanup also involved those in the political, regulatory, and public policy arenas, who work — together usually — to try and ensure Hanford is safely cleaned up.

From the 15 Year Report, October 2004:
There is no question it has been an eventful five years at Hanford. A range fire in July 2000 burned about 45 per cent of the site — threatening many contaminated facilities and burning over a few waste sites. Plans to privately finance the construction of facilities to immobilize some of Hanford's most dangerous wastes fell apart that same summer. To DOE's credit, they were able to recover from that debacle, and construction of those facilities is now well underway using government financing.

Significant progress was made in other key projects — moving pumpable liquids from the single shell tanks to double shell tanks, moving spent nuclear fuel to interim storage away from the Columbia River, and stabilizing tons of plutonium. In addition, we've seen the cocooning of several nuclear reactors, the dismantling of plutonium-contaminated facilities, and movement of huge amounts of contaminated soils away from the Columbia River shoreline.

This progress occurred despite substantial conflict. DOE and its regulators were often at odds. The State of Oregon, the Yakama Nation, and several citizen groups initiated or joined litigation against DOE.

After 15 years of cleanup, we have reached a pivotal place in Hanford cleanup. Most of the immediate risks have been successfully resolved. Now the focus is squarely on the quality of the remaining cleanup. And there is considerable debate about that issue.

There are still plenty of long-term risks. Extensive groundwater contamination remains and huge amounts of waste are still moving in Hanford's sub-surface to the groundwater, including high-level radioactive waste leaked from the tanks. Highly radioactive materials remain in unlined burial grounds. And, until we can put those vitrification facilities to use, 53 million gallons of high-level waste remains in 177 underground storage tanks.

The public's insistence that cleanup continue has — without question — had a huge impact at Hanford. The successes at Hanford are a shared accomplishment by all who have worked to see cleanup move forward. But the job is far from over and your continued involvement is absolutely necessary.

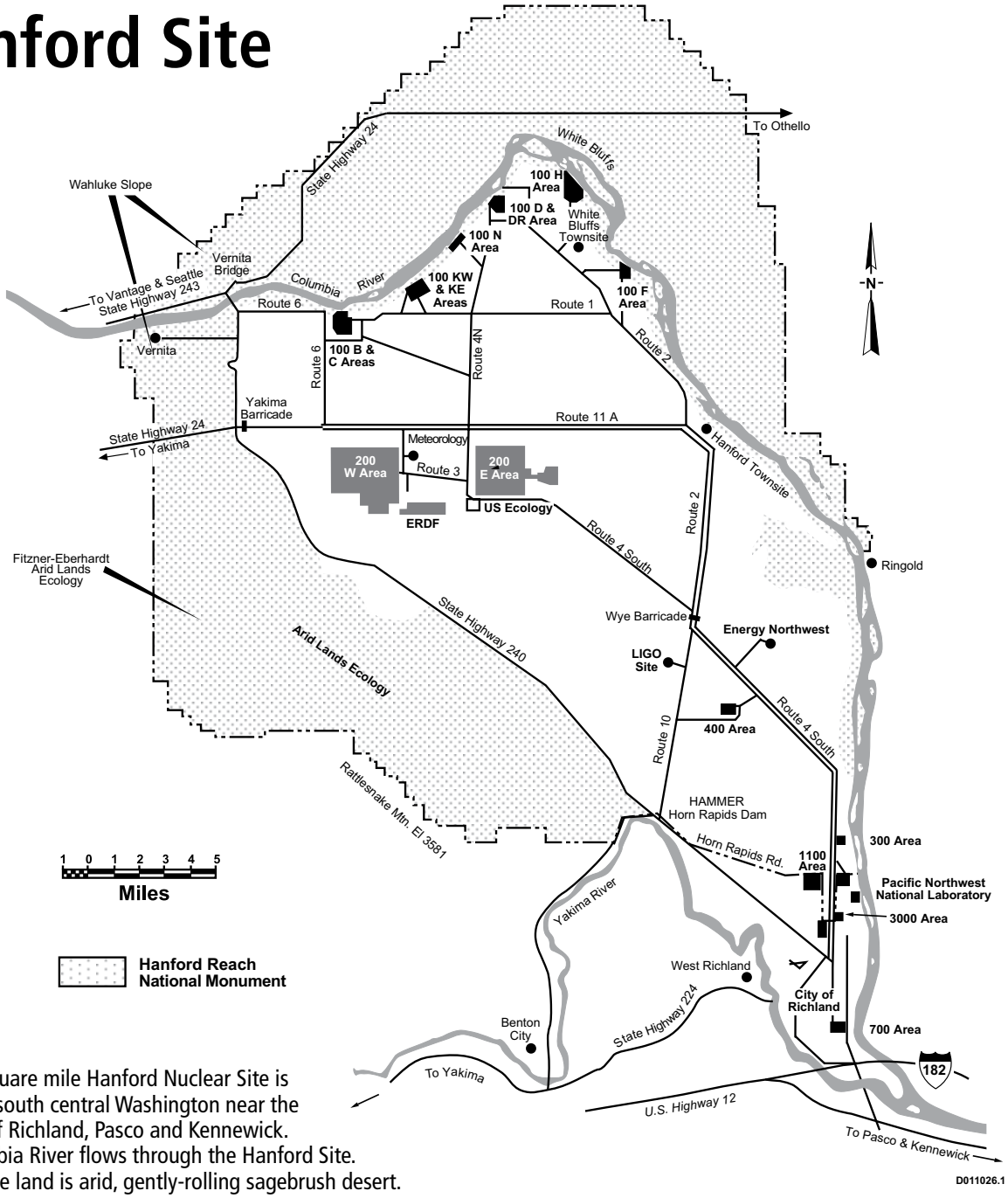
From the 20 Year Report, July 2009:
The cleanup is not nearly as far along as any of us expected or would like to have seen. The remaining challenges will require significant funds, technical ingenuity, and dogged determination to see the cleanup through to completion.

This is not the full story of Hanford cleanup. But it is a big part of the story. This report was not intended as 'the Oregon view' on the cleanup, and we made no attempt to 'spin' this report so as to be overly critical or overly complimentary of the work that has been done. We've attempted merely to provide information on what happened and when — the good and the bad; the breakthroughs and the breakdowns; and much in-between.

We believe the history of Hanford cleanup offers us lessons for the present and for the future and is well worth documenting. We have already seen that assumptions made during the operating years about the finality of waste disposal have in many cases proven to be very wrong. Considerable effort has gone into digging up many old burial grounds and disposal areas that were thought at the time to be safe and permanent disposal places. We hope that decisions and actions that have been made during these past 20 years are protective and durable.

The biggest lesson may be one that has been

Hanford Site



The 586 square mile Hanford Nuclear Site is located in south central Washington near the Tri-Cities of Richland, Pasco and Kennewick. The Columbia River flows through the Hanford Site. Much of the land is arid, gently-rolling sagebrush desert.

Numbers are used to designate specific areas at Hanford. At the north end of Hanford, along the Columbia River, are the 100 Areas where nine nuclear production reactors were built. All of these reactors are shut down.

Hanford's chemical separations plants are situated in the 200 Areas, near the middle of the site. A series of chemical processes were conducted in these huge plants to separate plutonium from irradiated nuclear fuel. The 200 Areas are also where Hanford's 177 underground waste storage tanks are located.

Laboratory, research and manufacturing facilities were in the 300 Area, near the southeast corner of the site.

A shut-down research and test nuclear reactor, called the Fast Flux Test Facility, is located in the 400 Area, just northwest of the 300 Area.

Warehouses and vehicle maintenance and transportation operations were located in the 1100 Area, on the site's extreme southern border.

verbalized many times, yet often ignored — by Congress, by DOE, by regulators, by many of us. That lesson is that there are few quick and inexpensive solutions at Hanford. Virtually every project at Hanford has taken longer, cost more, and been more difficult than the initial estimates. Past efforts to accelerate projects, reduce costs and minimize the level of cleanup have almost never been successful.

Cleanup in 2020 and beyond will be much different than the cleanup of today. By 2020, DOE should be long-finished with cleanup along the Columbia River corridor and the area of cleanup should have been reduced to perhaps as few as 20 square miles or less on Hanford's Central Plateau. The Waste Treatment Plant will also hopefully be coming on-line and beginning to immobilize some of Hanford's tank waste.

In writing this report we have relied upon official correspondence, news releases, and various reports from a variety of agencies and organizations. We have also drawn heavily from coverage by the news media – the Tri-City Herald in particular, but also the Associated Press and other media sources.

We have found that the words of so many of those involved with cleanup have great resonance. You will find many thoughtful quotes throughout this report. These few words often best sum up the successes and the struggles.

Now, 20 years are behind us, and the landscape, the culture, and the challenges at Hanford are mostly very different from what they were when cleanup began. We're not yet at the halfway point and have not yet reached the point where everything seems doable and achievable. There are several major challenges yet to overcome – tank waste retrieval and treatment; cleanup of groundwater and deep vadose zone contamination; and the need for continued funding, to name a few of those challenges — before we can be assured that the cleanup will ultimately be a success.

In the five years since our last report, we have once again seen considerable progress in certain areas, and yet a continuation of the struggles with the tank waste treatment program.

One of the biggest accomplishments during the past five years was a large expansion of groundwater treatment capability, both near the Columbia River shoreline and in the Central Plateau. Many of the groundwater contaminant plumes have been shrinking due to the new treatment capacity and to efforts to remove contaminant sources deep in the soil from several of the reactor areas. We've also seen considerable progress in the surface cleanup along the river corridor, and a shrinking of the cleanup footprint of the site. Much of this work was accomplished with nearly $2 billion in federal stimulus funding.

In some ways, the tank waste treatment program seems no closer than it was five years ago. Litigation by the State of Washington resulted in new deadlines for tank waste retrieval and treatment, but those new deadlines have already become moot. Construction on the pre-treatment facility has stopped as several technical issues need resolution. There was considerable focus on the "safety culture" at the Waste Treatment Plant. And the October 2012 discovery that one of the 28 double-shell tanks is leaking from its inner shell was yet another reminder that many of the problems are growing worse over time.

What the cleanup will look like in five years, or 10 years, or 25 years is anyone's guess. Certainly many of the predictions during the past 25 years about what would happen and when proved to be wildly incorrect. Clearly we are nearing the end on the River Corridor cleanup — whether it's by 2018 or 2020 or even later — the end does seem reachable, though the groundwater treatment systems will likely run for decades to come. The end also seems inevitable for the Plutonium Finishing Plant. At some point in the next several years, the hazards that have been posed by that facility will finally be gone.

For the bigger challenges — tank waste treatment especially, as well as much of the Central Plateau cleanup, including the deep vadose zone – it seems pointless to predict when these may be accomplished, or to what extent.

The passage of 25 years has not changed the reasons or the necessity for the cleanup. Hanford cleanup is essential to prevent further contamination of the Columbia River. The cleanup is also necessary to restore precious and valuable resources such as the groundwater; comply with environmental laws and restore the damaged environment; preserve treaty rights; and eliminate or reduce risks to all people who live in, work in, or visit the area. However long it may take — these are the ultimate goals.

Transition to Cleanup

A lot happened in the mid-and late 1980s that led to the May 15, 1989 signing of the Tri-Party Agreement. It was a tumultuous time in many ways.

Mike Lawrence came to the Hanford Site in July 1984 as the new Operations Office Manager for the Hanford Office. He was 36 years old and had been with the U.S. Department of Energy (DOE) and its predecessor agencies since 1969. His last position before coming to Hanford was as Acting Director of DOE's Office of Civilian Radioactive Waste Management, which was responsible for siting, constructing and operating a deep geologic disposal facility for high-level nuclear waste and spent nuclear fuel.

Lawrence shared some of his memories of those years.

> **When I came to Hanford in the summer of 1984, it was a very interesting time for the site. The PUREX plant had just started up again to process fuel coming out of N Reactor and the site was back into a weapons plutonium production mission, with all the processes associated with that — fuel fabrication, reprocessing, and converting the plutonium that was recovered into metal which was then sent to Rocky Flats.**
>
> **Hanford was also under consideration then as one of the five finalists for characterization as a nuclear waste repository.**
>
> **The Fast Flux Test Facility was operating as a demonstration sodium fast reactor.**
>
> **The national laboratory was operating at that point in time.**
>
> **So there was a full range of missions and unlike now there was only one DOE office here responsible for all of those things.**
>
> **Over the course of the next six years, all of those missions basically went away (except for the national laboratory) and it transitioned solely to a cleanup site.**

Lawrence said one of the things he found at Hanford was a government agency with little regional credibility.

> **In January of 1984 there had been a release from the PUREX plant while they were processing material. DOE and its contractor, Rockwell, had to explain to people what it was. And there was absolutely no trust or belief in what they were saying. There was a lot of skepticism from the public.**
>
> **It had always been my belief that the only way a government operation can function effectively is with the trust and confidence of the people. And so when I came out here I found, unfortunately, tremendous distrust in the Northwest. A lot of that was because of the mission and because of opposition to nuclear weapons. I understand that and I know you're not going to really win those people over.**
>
> **But I felt that was compounded by the fact that it was a very secretive operation, that there wasn't a lot of interaction with the public, and there wasn't a lot of effort to explain to the public what you were doing — except when something went wrong. I felt that it was really important to try and change that.**
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> **Over the course of the next several years there were things that we tried to do to open ourselves up and be more open to explaining to people what was going on and why it was happening, not necessarily to change opinions, but at least to provide more openness and transparency.**
>
> **It also was my belief that whereas organizations can lose credibility, only individuals can really gain it back.**
>
> **After I had been here about a year or so, one of the priests at one of the churches here called and informed me that the three Roman Catholic bishops in the state of Washington were preparing a letter regarding Hanford. It was basically blasting Hanford for its actions and accusing Hanford of lying and deceptive activities.**

I'm Roman Catholic and I had met one of the bishops, Bishop William Skylstad from Yakima. So I set up a meeting with the bishop, went to Yakima to talk about this letter, and several others were there including the individual responsible for writing this letter.

We got into the discussion and the discussion was going along and finally the bishop he puts his hand over on my arm and he says, "Mike, Mike, you're taking this personally. Don't take this personally." And I said, "Bishop that's exactly it. When you say the Department of Energy is lying to you, who do you think that is? I'm the one telling you this and basically you're saying I'm lying." He actually sat back and said, "Oh my goodness, I never thought of it that way."

In 1985, Spokane newspaper reporter Karen Dorn Steele wrote an article about Hanford's downwinders, which included many stories from people concerned that they and their family's health problems were directly related to Hanford's past releases of radioactive materials into the atmosphere.

That was the first time that whole issue of people downwind of Hanford, living in Pasco or Eltopia came up, people who felt that they and their families had experienced disproportionate cancers due to Hanford. It was a very well-written, well-documented and heart-wrenching article. It appeared in the Sunday paper. I knew that all the epidemiological studies and the reviews that had been done by Pacific Northwest Laboratory and other independent epidemiological groups had not seen a correlation with cancer. Yet these people certainly felt very strongly and the article made a very compelling case for it. So we very quickly set up a meeting in Eltopia that Thursday night to go with the monitoring people and with the people who put out the environmental reports so we could talk to the people and explain to them what the information we had showed.

The meeting was pretty intense. During the course of the meeting one of the comments that was made was "We aren't questioning what you are doing now necessarily. But what happened in the 1940s and what happened in the 1950s? What were you doing then? We don't know anything about that."

From my knowledge of working with classified material all of my career, I knew that those documents by and large could be declassified. Now it would take a lot of effort to do that and it would take expense and time, but they could be declassified. I committed then and there that we would go back and declassify those documents and release them so they could see what the numbers were and what the environmental measurements were.

Fortunately I had the authority — operations office managers had a lot more authority and independence then than they do today — to say we were going to do that and then could find the budget to do that. And that subsequently resulted in about five months later in February of 1986 when the initial 19,000 pages of documents were released.

The documents, quickly reviewed by citizen groups and state officials, revealed that extensive amounts of radioactive materials were released from Hanford, especially during its early years of operations. One particular document drew intense interest — a document that provided information about an intentional secret radiation release in December 1949.

As many people will remember, there was this issue of the Green Run in 1949, where nuclear fuel that had only been cooled for about 30 days and consequently had a much higher iodine 131 concentration, was processed and released. When we were going through the review, there were a number of things in there that the classification people crossed out.

So when the documents came out and people had a chance to look at it, there was

a focus on the Green Run and why it was done. And there was an accusation made that it was human experimentation. I knew that wasn't the case, but because of the classification, I couldn't tell people why. And we were really in a bad situation because the people weren't taking our word for it.

Ultimately, what I decided was that the representatives and senators from Washington and Oregon had clearances and they could be told. Hopefully they had credibility with the public and we arranged to go back to Washington D.C. and brief them. There's a little classified room in the rotunda of the Capitol where we briefed the Washington and Oregon delegations as to the reason for the Green Run. Washington Congressman Tom Foley, who was more or less the dean of the two states' delegations, said "Ok, we understand now, we know it's not experimentation. But we need more than that to be able to tell the public." And I was able to get on the phone and work out with the department that we could tell them that it had to do with detection of Soviet production capabilities back in 1949. Subsequent to that it has been declassified and the reason you couldn't talk about it then was the government was still using that technique to detect proliferation by rogue states. I remember we finished the meeting and the Congressmen came down and all the media was there from the northwest and they said it's been explained to us, it did have to deal with our ability to track what the Soviets were doing. It helped diffuse that issue, so I was really kind of proud the way all that transpired.

Soon, there was new attention focused on Hanford, with the April 1986 nuclear accident at Chernobyl.

The national press couldn't go to Chernobyl and very quickly people said, "Well wait a minute, there's a reactor with some similar characteristics out in Washington State. Let's go out there."

Consequently, about five or six days after the accident occurred, I remember the lobby of the federal building was packed with media from ABC, NBC, CBS, the *New York Times*, the *Los Angeles Times* and the *Washington Post*, all wanting to do a story on N Reactor. So I picked up the phone and called Headquarters and they said, "You can't talk to them." And I said, "You're crazy. There will be articles written, they can be based on fact or fiction, we've got to talk to them." And they said "You can't talk to them." I said "Why?"

At the time there had been some quotes coming from scientists at some of the other national labs speculating on what had happened at Chernobyl and they were just speculations. I said "look, I don't know what's going on at Chernobyl, I just want them to know the facts about N Reactor. And yes there are some similarities, but there are so many things different I just want them to know what our reactor is and what our safety features are."

Yes, N Reactor didn't have a containment dome the way all power reactors do, but it has a system called confinement designed to release pressure but keep the radioactivity contained. We learned at Three Mile Island and we really learned it in terms of Fukushima — if the pressure builds up and you have a hydrogen explosion, you can have very serious problems. So you have to have a way of releasing the pressure without letting the radioactivity out. We had that, but people didn't understand it.

Ultimately, DOE Headquarters said, "Okay you can talk to them and you can show them the N Reactor, but don't say anything about Chernobyl."

So we put them all on a big bus and went out to N Reactor. I think going out there they all probably had in their mind's eye a little Quonset hut with steam escaping out. We had these three and a half foot thick concrete doors that we had swung

open so that they could see the size of it, and showed them the reactor face and a fueling area. We were able to explain how the safety systems worked and in the case of an accident explain what would happen. By and large, the stories came away much more positive than they would have otherwise.

Although there are people who believe with the passage of time that N Reactor was shut down because of Chernobyl, that is not the case. N Reactor was shut down because we no longer needed the plutonium.

About the same time, DOE publicly released a draft Environmental Impact Statement, assessing potential disposal paths for Hanford's defense high-level, transuranic, and tank wastes.

A major driving force was in 1984, when a Federal district court found that the State of Tennessee did have jurisdiction through state environmental regulations over DOE's nuclear facilities in Oak Ridge. That was a landmark decision.

When I arrived here the assumption was we were in compliance because we wrote our own rules and we were following those rules and that was fine. With the court decision we were automatically out of compliance because the state rules and laws applied and we weren't in compliance with them. So we had to come up with some way of getting into compliance and that prompted the Environmental Impact Statement.

The ruling was a forcing function and added some urgency to what we were doing. If the department was doing it at its own pace without a regulator saying you have to do this, it would have taken a lot longer. It's taking a terribly long time as it is right now, but that's because technically it's very challenging.

Over the years I think that we were able to build up greater transparency and openness with the public. I was concerned that when we got to the point of cleanup, of trying to explain why it wasn't necessary to remove all the waste from the tanks for example, that we might have a hard time convincing the public that the risk was very low. So I felt the formation of some citizens group that you could give all the information to and they could come to some conclusions would be the best way of doing it. That's ultimately what led to the Northwest Citizens Forum on Defense Waste which was the first of any citizen's advisory group at any of the production sites and ultimately led to all the advisory committees that exist today.

By the time the Tri-Party Agreement was signed, the plutonium production mission had ended, the repository program at Hanford was cancelled, and the Fast Flux Test Facility was shut down while DOE looked for a mission for the reactor.

It really wasn't obvious all these changes were about to happen. Quite frankly, some of those things I think we would have been better off if we had gone down a different path.

I once raised some eyebrows when I said if the plutonium we have produced here is ever used, we will have failed because the sole reason for our plutonium production was deterrence. So the fact that we had enough plutonium and we didn't need any more was a great plus and a victory. I didn't expect it to happen that quickly but I am glad it did. I think we are all safer and better because it did.

As far as the repository program, the nuclear waste policy act was set up with a process of looking at three sites in depth, getting all the information, and then selecting one. What happened was half way through that process they said, "We don't need to do any more, let's just continue with Yucca Mountain and we'll put all our eggs in that basket."

No site was going to be perfect and clearly I think that Hanford might not have made

the cut at all. It might have been found unqualified. I was once quoted as saying "If tomorrow we were to come back and say we found a fatal flaw and Hanford is not suitable for geologic waste, we would have had a successful program because we would have determined it isn't capable." But we cut it off before it got to that point.

Consequently, Nevada always felt that they sort of got the booby prize because they were the smallest state with the least influence and it led to their very strong opposition. If they had thoroughly looked at three sites, saying here are the strengths and weaknesses to each one, and this is the one you are going to pick, I think the government would have had a much stronger argument. They didn't, and now we are back to square one again with the repository program.

So that's a program where I think it ended prematurely and we would have been better off had we gone through the process and really determined the strengths and weaknesses of Hanford, Texas, or Nevada, and then made a decision.

I believe the shutdown of the Fast Flux Test Facility was a mistake. Over the last ten years there have been a number of DOE programs where they could have really used the testing capabilities that existed in that reactor but we no longer have it. Consequently, any of our advanced reactor programs that exist in the country today, interestingly enough, require testing for sodium fuels and advanced fuels in Russia. And with our relationship with Russia the way it is today, I don't know what their status is. So I think we gave up a testing capability, perhaps prematurely.

All of that occurred during the transition from the site operating as a production site through the cancellation of the repository studies to the shutdown of the N Reactor because we didn't need any plutonium and to the shutdown of the FFTF and then ultimately leading to the signing of the Tri-Party Agreement. Quite frankly, I think the agreement would not have been possible without the trust that was built up between ourselves and the state of Washington, with Chris Gregoire as the Director of Ecology and Governor Booth Gardner.

During those negotiations, Lawrence built a strong professional relationship with Gregoire.

Our staffs were meeting daily, constantly working on those things, and we would get together once in a while but we didn't get together that often until the very end when the remaining issues had to be dealt with. I can remember getting calls as she was traveling from Seattle back to Olympia with a question about something that had come out of the negotiations. Since there weren't cell phones, she must have had a mobile phone in her car the size of a shoe box.

I always enjoyed and I very much valued the fact that we always did have a good professional relationship in terms of trust. It helped that you could pick up the phone and talk. That to me is one of the things that might be, I don't want to say lacking today, but with more lawyers involved and the Department of Justice involved, it has a chilling effect of what you can do.

When it came time to reach final agreement on the Tri-Party Agreement, I went to Olympia with (DOE official) Ron Izatt and one of our lawyers and met with Chris and her team. They were all in agreement to take it to court and have the court's blessing. I said that won't work from our perspective because the Department of Justice does not believe in friendly lawsuits. They do not settle anything and they will resist. And I said "No doubt in my mind, you're going to win, but it's going to be two years or more before that happens and nothing will be done in the interim. Why don't we shake hands, sign the agreement and try and live by it and then if we don't live up to your expectations then you take us to court."

Chris said based on her discussion with the Governor, Washington really needed a judge to bless the agreement. At the end of the meeting I said "Chris, I'd like to raise this with the Governor." And thank goodness she said "Sure, let's go talk to him."

So the following Friday, this was in December of 1988, we went over and just she, myself, and Governor Gardner met in his office. I went through the fact that if we go to court, Justice would fight it, nothing will get done, you'll win but we'll lose a couple of years. He insisted that Washington needed the court's involvement. We went through that argument several times. I think it was about the third time when Governor Gardner turned to her and said "Well Chris, could you live with it if we tried it that way?" She essentially said, "Governor if you can, I can." And we agreed to it. Today I'm seeing more and more where the Department of Justice does have a strong say and restricts what can be said and the amount of interaction and the flow of information. I'm very grateful for starting off without that.

We kept both the General Counsel's office and environmental cleanup organization at DOE headquarters informed of the negotiations as we were going along. They knew what the issues were and they knew they were being resolved. It was going up to the Secretary of Energy, who was an acting secretary at that time because it was the transition from President Reagan to President Bush and the administrations were changing. The acting secretary, Donna Fitzpatrick, had been an assistant secretary previously and was totally informed. Even after President Bush announced Admiral (James) Watkins as his designee for Secretary of Energy, I know that Acting Secretary Fitzpatrick told him about it. But when you are learning about all these things you don't really focus on it. So we did have their agreement and blessing from both legal and environmental management.

▲ *Energy Secretary James Watkins and Hanford Manager Mike Lawrence.*

Unfortunately it didn't seem that way. In February 1989, we announced we had reached an agreement and we intended to sign the Tri-Party Agreement after a 90 day period of public review. It was announced with some fanfare and with the Washington and Oregon Congressional delegations in the rotunda of the Capital Building in Washington D.C.

The very next day was Secretary Watkins' first day on the job. All the field office managers and all the operations office managers were back to meet with the Secretary on his first day.

There was a lot of publicity from the previous day's announcement. You may recall that one of the stock questions and lines was "What does this represent in terms of dollar commitment for cleanup." At the time I think the number was $50 billion. Someone from the state, I think it might have been Governor Gardner, it might have been Chris Gregoire said, "This commits the government to spend

50 billion dollars for the cleanup of Hanford." That was the headline.

The Office of Management and Budget reads this in the paper the following morning, picks up the phone and calls the new Secretary of Energy, Admiral Watkins, "What in the hell is this about 50 billion dollars being committed? You've tied our hands, and on and on."

So, several hours later I go into a meeting with all my peers and Secretary Watkins comes walking in and just literally tears into me about this terrible thing that we had done, committing the government to 50 billion dollars of cleanup. I couldn't say anything and you just sit there and assume a fetal position and get the living daylights beat out of you. I felt like, well, I better go and write my resignation letter when we leave here. It was a pretty uncomfortable time.

Fortunately however, the press clippings started coming in about what a wonderful thing the Tri-Party Agreement was and the fact that the department can work with the state and they came to an agreement to clean up Hanford waste. Then the Secretary started getting these complimentary telephone calls from people saying what a great thing it was and I never heard anything more from him about the Tri-Party Agreement.

As cleanup at Hanford was just getting underway, the DOE nuclear weapons complex was shaken by a June 1989 FBI and EPA raid of DOE's Rocky Flats facility in Colorado.

I knew about it before it happened because I got a call from the Secretary's office the previous week on Thursday and it was Leo Duffy (the head of the DOE environmental management cleanup program) and Leo said "Mike is there any reason why Ed Goldberg (Mike's deputy manager) couldn't be in Rocky Flats next week?" and I said "Leo, if you want Ed, I know no reason why he couldn't be there." And he said "The Secretary would like him to be at Rocky Flats next Monday night." He said "I'll call him. You don't tell him, I'll call him." I put down the phone and immediately said "Ed, you're about to get a call. They want you at Rocky Flats next Monday." And he said "Why?" And I said "I don't know."

Ed was a wonderful guy, we came here together as a team. I was the manager and he was the Deputy in 1984 and we had known each other for a long time. So Ed, who was kind of an excitable guy, solid as can be but can be excitable, goes to Rocky Flats. Monday evening he goes to this appointed room where the Deputy Secretary, Henson Moore and Leo Duffy are there. They said "Ed, tomorrow you are going to be the acting manager of the Rocky Flats Site." Ed said "Okay." They said "Your first job is to go down and open the gates when the FBI raids you." And so that is how it all came about, and that's how I found out about it.

I had no fears that (an FBI raid) would happen at Hanford. I knew we were not pushing the envelope here at all in terms of pushing the law and what we could get away with. The weapons complex, there was definitely a feeling of we're defending the free world here. When the managers got together there were always these knock-down drag-out fights about what we could do, what we should do, and what we shouldn't do. But I had enough confidence and I felt that knowledge of what was going here that I wasn't concerned about (an FBI raid) here.

Lawrence and Watkins at times clashed during the early months of Hanford cleanup. Lawrence was chastised by Watkins for speaking frankly about potential hazards associated with Hanford's waste tanks.

I have huge respect for the nuclear navy and the program and systems that Admiral Rickover put in place and Admiral Watkins was a disciple of and strong believer in that. Leo Duffy was part of that as well. Where I felt they missed a point was

that in the nuclear navy, every person who joined, even at the lowest level, was interviewed by Admiral Rickover. The personal interview was quick, but they were brutal and he would say "Yes, you're in, no you're out." From the moment they were accepted they went through a training process and a grooming process that was all part of bringing them along with the knowledge they needed to do their job. And it has worked phenomenally well. The nuclear navy has an incredible safety record and exceptionally good people.

▲ *Mike Lawrence and wife Cindy in late 2013.*

You just can't throw that into the Department of Energy and expect that to work. Consequently there has to be some give and take and I think Admiral Watkins had a hard time appreciating that. He was very knowledgeable but he came from a culture and background that I don't think that the department could ever fully really live up to.

Lawrence looks back now on a full career which included twice working overseas, and has a warm feeling about those years at Hanford.

The job I enjoyed the most was being Manager of the Richland operation office. It was my belief then and it still is today that Field Operations Manager was probably one of the best jobs in the government. You were actually operating something and you were producing something. Now, it might have been plutonium and it might have bothered people, but still it was something Congress said is something we need for national defense. You were a civil servant responsible for a large site, and at that time it was about 14,000 employees with a budget in those days probably on the order of about $800,000,000. You had a real purpose and a mission and I enjoyed that. I enjoyed that very much.

1989

"This agreement means that, at long last, we can begin a massive effort to clean up the 45 years of accumulated chemical and nuclear wastes at Hanford."

– Washington Governor Booth Gardner on the signing of the Tri-Party Agreement. (*Tri-City Herald*, May 16, 1989).

The Cleanup

The May 15, 1989 signing of the Tri-Party Agreement did not immediately shift Hanford into clean-up mode. While most of Hanford's plutonium production facilities were shut down, few anticipated that Hanford was out of the plutonium production business. N Reactor and PUREX were both in standby, and there was a full expectation that at some point in the not too distant future, Hanford would resume production of plutonium.

So it was understandable that other production-type missions were under active consideration as cleanup began. U.S. Department of Energy (DOE) officials were looking at a Hanford test reactor, the Fast Flux Test Facility, as a potential producer of plutonium 238 to power spacecraft. Washington Senator Slade Gorton meanwhile, wrote Energy Secretary James Watkins in support of completing an unfinished commercial nuclear reactor at Hanford to make tritium for the nation's nuclear weapons program. Oregon Senator Mark Hatfield and Idaho Senator James McClure had earlier written opposing the plan to complete Washington Nuclear Plant #1.

This search for new missions at Hanford is but one of several issues that never seemed to quite go away over the last 20 years. Another was the import of waste to Hanford for storage or disposal. In October, Washington Governor Booth Gardner wrote to Secretary Watkins opposing the import of transuranic waste from Rocky Flats to Hanford for indefinite storage. Because of continued delays in opening the Waste Isolation Pilot Plant in New Mexico, and refusals by Idaho to allow more waste to be stored at the Idaho National Engineering Laboratory, DOE was looking for alternative sites for waste from the Rocky Flats site in Colorado.

Meanwhile, the business of cleanup began — albeit slowly. The first site proposed for cleanup under the Tri-Party Agreement was Hanford's vehicle maintenance area, near the Richland city water wells. Battery acid, solvents, paints and other chemicals were the concern.

The U.S. Environmental Protection Agency (EPA) added four Hanford areas to its Superfund National Priorities list — the 100, 200, 300 and 1100 areas.

"The important thing is to get it begun. Committing 'X' billion for the cleanup is probably impossible. You can't bind a future Congress to future spending."

– Washington Congressman and newly-elected Speaker of the U.S. House of Representatives Tom Foley, on Hanford cleanup. (*Spokesman Review*, June 7, 1989).

"It is time that the Energy Department came clean with the American public about its plans for what is really one of the nation's largest and most dangerous industrial operations."

– Dan Reicher, Natural Resources Defense Council (NRDC) attorney, after the NRDC and other environmental groups filed suit to force DOE to conduct a comprehensive analysis of its safety and environmental problems. (*Tri-City Herald*, June 28, 1989).

"The Congressional delegations of both our states have fought hard for realistic funding levels to get the cleanup underway...the fight will be won or lost in the federal budget trenches."

– Michael Grainey, Deputy Director of the Oregon Department of Energy, providing comments on the draft Tri-Party Agreement. (March 29, 1989).

"It will turn millions of gallons of low-level radioactive wastes at Hanford into a block of solidified grout that will protect the environment for the next 10,000 years or more."

– John Van Beek, Westinghouse Hanford Company, following the announcement by DOE that it would begin construction in November on four new grout vaults (a program later abandoned). (*Tri-City Herald,* October 21, 1989).

The General Accounting Office (GAO) — the investigative arm of Congress — has been a frequent critic of DOE's performance at Hanford throughout the 20 years of cleanup. The GAO performs audits and evaluations of Government programs and activities. From 1989 on, the GAO conducted dozens of audits related to DOE's nuclear weapons cleanup program and many specifically related to Hanford cleanup. A report issued in July challenged DOE's conclusion that there was little or no environmental impact from Hanford's leaking waste storage tanks. The report urged DOE to pump waste out of the tanks without delay.

The complexity and the enormity of the cleanup challenge ahead was not fully understood nor appreciated. But there were signs early on that the job was going to be bigger, tougher, and more expensive than anyone had predicted.

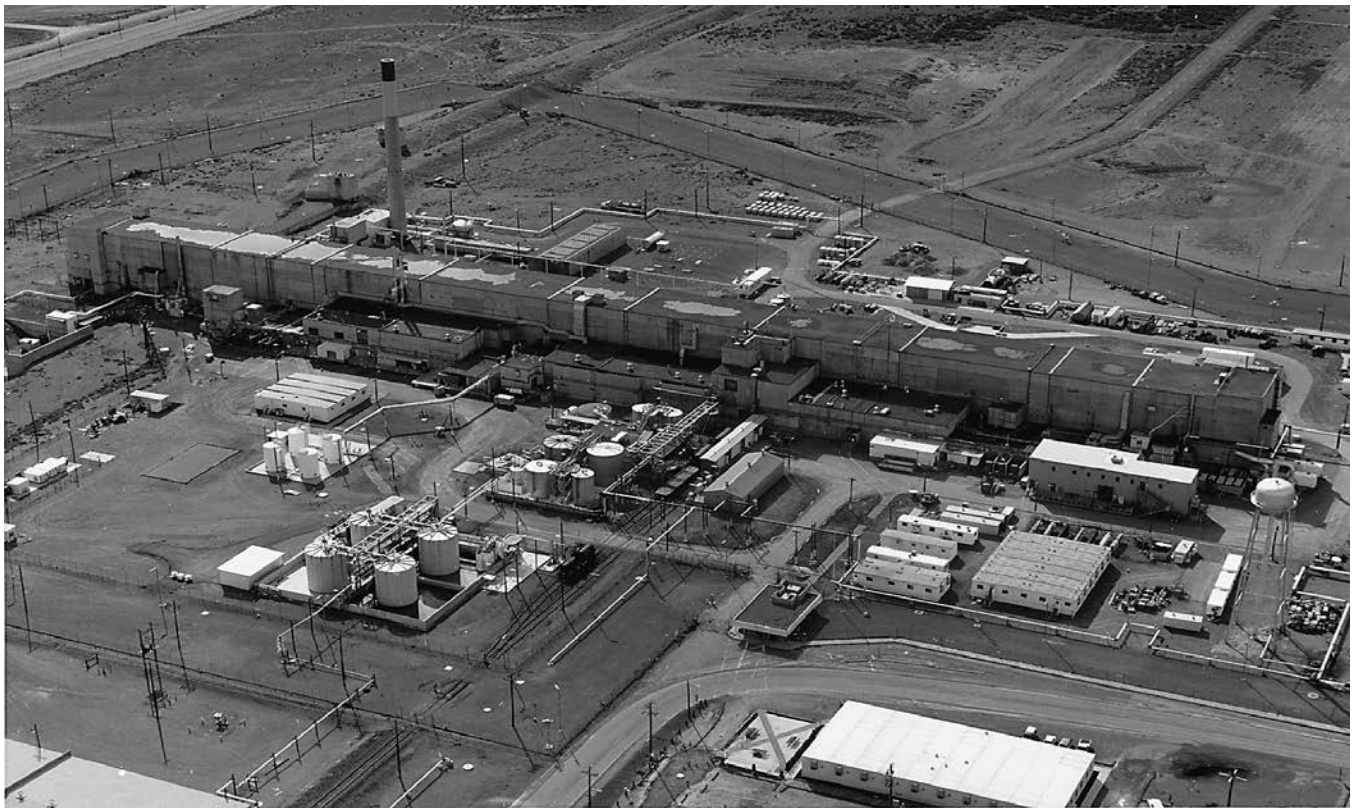
A big concern by regulators was the discharge of liquid wastes to the soil. Even though most plutonium production activities had ended at the time the Tri-Party Agreement was signed, as much as 22,000 gallons of contaminated water a minute was still being dumped into the ground at Hanford. More than 400 different liquid waste streams were identified at Hanford. DOE, EPA and the Washington Department of Ecology agreed that the 33 worst waste streams were to be stopped or sent to treatment facilities by June 30, 1995, with the remainder stopped or treated by October 31, 1997. In the first of what would be numerous occasions of the same refrain, DOE officials said it would cost more than they anticipated to stop these liquid waste discharges.

Seemingly, one of the most important steps taken in support of cleanup was DOE's award of a $550 million construction contract to begin building a high-level waste vitrification plant. The vitrification plant would be used to immobilize the waste in Hanford's underground waste storage tanks. Construction work was scheduled to begin in 1991 with plant operations beginning in 1999. Final project costs were expected to reach nearly $1 billion.

DOE's plan was to remove the waste from the tanks, separate the waste into its high and low-activity constituents, and immobilize the waste using two different processes. The high activity waste would be mixed with materials to form a molten glass. The glass would be poured into steel canisters where it would harden. This process is called vitrification. The plant was expected to produce about 300 canisters a year. At that rate, it would take more than 10 years to vitrify all the high-level waste at Hanford.

The low activity waste — which generally contained lower levels of radioactivity in large amounts of material — would be mixed with cement, fly ash and other materials. It would then be poured into huge 1.4 million gallon underground cement vaults, where it would harden into a cement-like substance called grout. It was expected that about 50 grout vaults would be needed at Hanford.

There was an expectation that Hanford cleanup would eventually create some new jobs — but not enough to offset plutonium production



▲ *Hanford's PUREX plant.*

jobs. Hanford Site Manager Mike Lawrence predicted cleanup would create 1,400 new jobs between 1993 and 1999, but was still expecting an overall reduction in Hanford jobs, due to cutbacks in production.

At year's end, the Plutonium Uranium Extraction facility, or PUREX, resumed limited operation. The unexpected shutdown of the facility had left chemicals and radioactive materials in miles of pipes and a "cleanout" run was necessary. PUREX was the largest chemical processing facility at Hanford. It is 1,005 feet long, 104 feet tall and 61 feet high. Through a series of different chemical processes, the PUREX facility separated uranium and plutonium from nuclear fuel irradiated in Hanford's reactors. "Hot" operations began in January 1956 and by 1967, PUREX was the lone operating processing facility at Hanford. In 1972, the PUREX plant began a planned 18 month shutdown period that ultimately lasted 11 years. Extensive modifications, along with the construction of new double-shell waste storage tanks occurred during this time. The plant re-opened in 1983 then closed again for a year beginning in December 1988. PUREX accounted for about 80 percent of the 53 tons of plutonium produced at Hanford. DOE was still planning a full restart of PUREX in the fall of 1990 to process 2,100 tons of spent nuclear fuel stored in water-filled basins near the K Reactors.

A detailed inspection of the process tubes in Hanford's N Reactor showed the tubes to be in excellent condition. The process tubes held the fuel assemblies and allowed cooling water to circulate around the fuel. The reactor was being prepared for "dry standby" status – preserved as a contingency should it be needed to produce tritium for the nation's defense program.

"Based on the information we have, we know the internal components of the N Reactor are strong and healthy."

– Luis Gonzales, Westinghouse Hanford Company. (Westinghouse Hanford Company News Release, December 6, 1989).

"The underlying operating philosophy and culture of DOE was that adequate production of defense nuclear materials and a healthy, safe environment were not compatible objectives. I strongly disagree with this thinking."

– Energy Secretary James Watkins.
(DOE News Release, June 27, 1989).

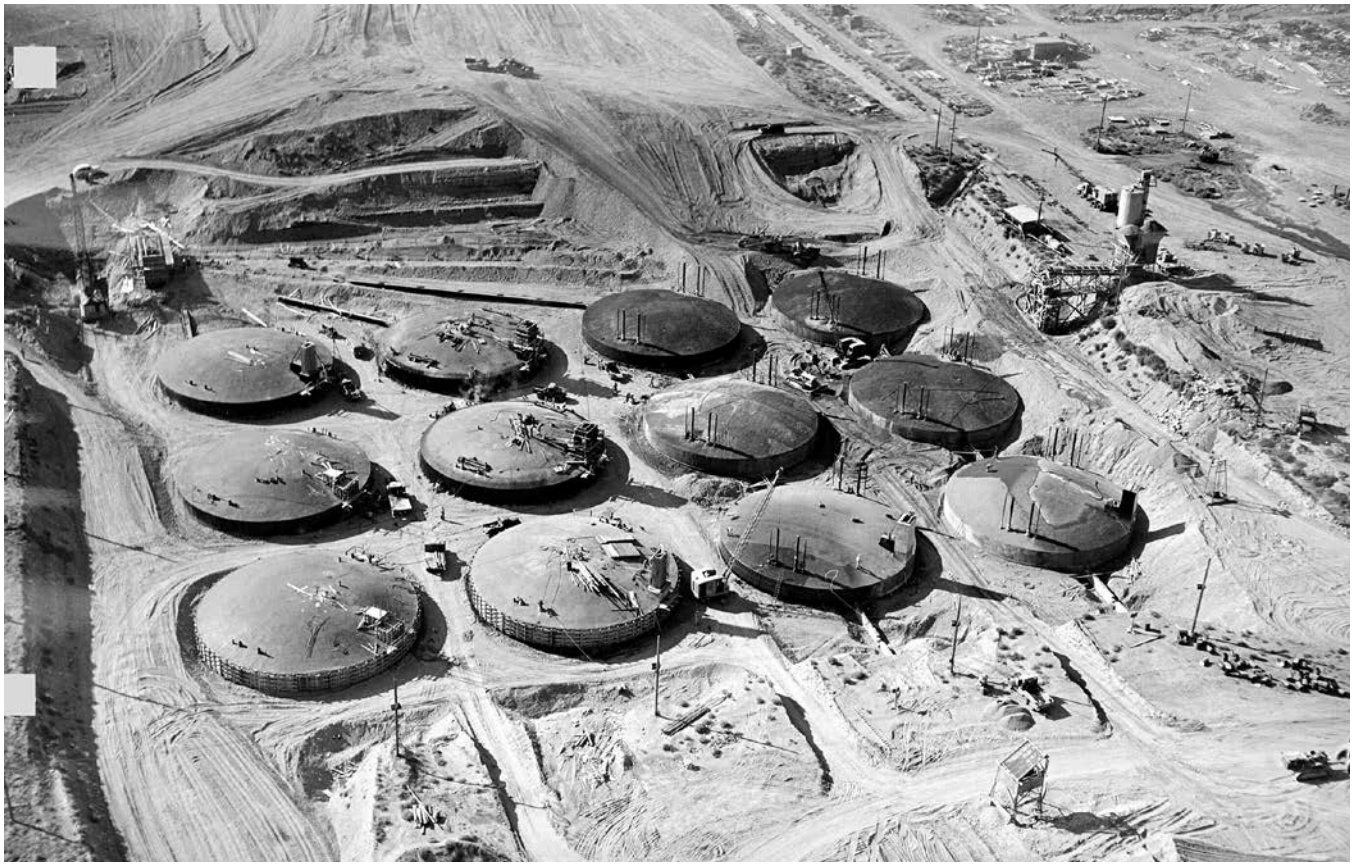
In the previous few years the Navy had sent six submarine reactor vessels for disposal at Hanford. It was discovered that the six contained PCB's — a known carcinogen. Washington Governor Gardner and Oregon Governor Neil Goldschmidt wrote the Navy and asked them to analyze risks posed by the PCBs before more reactor vessels were shipped to Hanford. The Navy eventually agreed to remove the PCBs from the six submarine reactor compartments already disposed at Hanford.

In December, Energy Secretary Watkins agreed to declassify all Hanford documents from 1944-1960 which described radioactive releases to the environment. His action came in response to a request from a scientific panel directing a study into public exposures from past radioactive material releases from Hanford to the environment.

Tank Safety

As cleanup activities begin to get underway, considerable attention began to focus on the safety of Hanford's underground waste storage tanks. During its 45 years of plutonium production, Hanford generated enormous amounts of radioactive and chemically hazardous wastes. Beginning in 1944, Hanford workers began to store the most hazardous of these wastes in large underground tanks. The first tanks had just a single shell of carbon steel for containment. Eventually, 149 of these single-shell tanks were built at Hanford. These tanks ranged

▼ *Hanford tanks under construction.*



in size from 55,000 gallons to one million gallons, with most of the tanks at least half a million gallons in size. After many of these tanks began to leak, tanks with double shells of carbon steel were built beginning in the late 1960s. Twenty eight double-shell tanks, all a million gallons or larger in size, were built at Hanford. Some of these tanks were also nearing the limits of their design life. Hanford's 177 waste storage tanks held about 60 million gallons of highly radioactive and chemically hazardous waste. Sixty seven of these tanks had leaked an estimated one million gallons of waste into the soil.

In October, Battelle Pacific Northwest Laboratory released a five year old report on the risk of an explosion in some of Hanford's waste storage tanks. Ferrocyanide was added to about two dozen tanks in the early 1950s to separate cesium from the waste. The report concluded that adding ferrocyanide increased the risk of an explosion. Under high temperatures and at certain concentrations, ferrocyanide could explode. Hanford managers did not dispute the report's conclusions but said temperatures in the tanks were too low to cause an explosion. Nevertheless, the report created a flurry of activity to understand the level of hazard posed by Hanford's underground waste storage tanks.

Hanford Manager Lawrence said DOE made a "mistake in judgment" by not releasing the Battelle report earlier. Lawrence agreed the report raised issues that needed further research. Governor Gardner appointed a special team to conduct an in-depth investigation of the explosive risk posed by ferrocyanide, while DOE's Advisory Committee on Nuclear Facility Safety began to examine the risk of a Hanford tank explosion.

Lawrence also revealed that the bottom of a Hanford tank ruptured in 1965 and released radioactive steam into the air. The incident was caused when moisture trapped between the floor of the tank and the concrete liner turned to steam. The steam caused an eight foot bulge in the steel liner.

Around the DOE Complex

Hanford was part of a very large complex of sites scattered throughout the country that were involved in the production of materials for nuclear weapons. Each of those sites as well was also beginning the transition from production to cleanup – some less successfully than others. In Colorado, DOE's Rocky Flats plant was raided in June by the FBI and EPA, which were investigating numerous environmental violations.

A new Congressional study showed DOE continued to emphasize production while giving little attention to public health and safety issues. The report cited 14 examples — including nine at Hanford — of a lack of, or disregard for safety.

In June, Energy Secretary Watkins announced a ten point plan to strengthen environmental protection and waste management activities at DOE's defense nuclear facilities.

"The risk of explosions in waste tanks has not received the attention it deserves."

– Ohio Senator John Glenn, urging nominees to the Defense Nuclear Facilities Safety Board to examine conflicting reports about tank safety at Hanford. (*Tri-City Herald,* October 18, 1989).

"I don't believe an explosion is credible."

– Hanford Manager Mike Lawrence, as DOE's Advisory Committee on Nuclear Facility Safety began to examine the risk of a Hanford tank explosion. (*Seattle Post-Intelligencer,* November 5, 1989).

"The way we've operated these plants in the past, was: 'This is our business, it's national security, everybody else butt out.' They're not going to be operated that way any more."

– Energy Deputy Secretary W. Henson Moore. (*Tri-City Herald,* June 17, 1989).

"I have personally spoken with the governors or their representatives and assured them that our goal is to provide them with a more substantive role in overseeing DOE's compliance with the law, and helping them assure their citizens that DOE operations do not constitute a health hazard."

– Energy Deputy Secretary W. Henson Moore. (DOE News Release, August 21, 1989).

"Unfortunately we don't have a five year problem. We have a 30 year problem."

– Washington Senator Brock Adams, after Energy Secretary James Watkins announced a five year cleanup plan for DOE sites. (*Longview Daily News and Associated Press*, August 2, 1989).

"Only through this difficult process will DOE, as an institution, finally begin to assume its proper role as a protector of the environment."

– Energy Secretary James Watkins. (DOE News Release, August 1, 1989).

"The chickens have come home to roost and years of inattention to changing standards and demands regarding the environment, safety and health are vividly exposed to public examination, almost daily. I am certainly not proud or pleased with what I have seen over my first few months in office."

– Energy Secretary James Watkins, who said environmental health and safety was now DOE's number one priority. (*Tri-City Herald,* June 28, 1989).

DOE invited governors of 11 states, including Washington, to negotiate formal, comprehensive agreements which would allow direct access and environmental monitoring by the states at DOE facilities.

In August, Energy Secretary Watkins announced a five year cleanup plan for DOE sites. Fully implementing the plan would require $19.5 billion. The plan committed DOE to a 30-year goal for environmental restoration, including a national prioritization system for cleanup (in consultation with states, tribes and the public), and compliance with environmental laws and regulations. Washington Senator Brock Adams and Congressman Norm Dicks, concerned about funding cleanup activities in the future, reintroduced legislation to establish a special trust to pay for long-term cleanup of DOE nuclear sites. The legislation never passed.

Energy Secretary Watkins established a new position of Assistant Secretary for Environmental Restoration and Waste Management. The new Assistant Secretary would implement DOE's five year plan and provide central management for cleanup at DOE sites.

A National Research Council panel recommended DOE not build a new $1.35 billion plutonium processing facility, and should instead focus on cleaning up its nuclear production sites. The panel said the nation's nuclear arsenal could be sufficiently maintained without new processing capacity. The panel also determined a significant quantity of plutonium had accumulated in the ventilator ducts at Hanford's Plutonium Finishing Plant — some beyond the filter systems.

"I'd like to see Hanford become the flagship for waste management research."

– Energy Secretary James Watkins, upon his first visit to Hanford. (*Spokesman Review,* August 29, 1989).

1990

"We no longer have a future in the defense business and we should quit wasting everybody's time and money pretending we do."

– *Tri-City Herald* Editorial, February 4, 1990.

The Cleanup

Even though Hanford's cleanup budget would eventually grow to more than $2 billion a year, lack of money has been a hindrance throughout most of the Hanford cleanup. In January, the Bush Administration proposed a budget which would increase Hanford's cleanup funding to more than $800 million for fiscal year 1991. Within two months, Washington state officials said the U.S. Department of Energy (DOE) 1991 budget request to Congress was still $245 million short of what was needed for work to continue on schedule at Hanford.

Hanford workers got both a pat on the back and a kick in the pants from the editor of the Tri-City Herald and the President of Westinghouse Hanford Company. In February, Tri-City Herald Editor Kelso Gillenwater challenged residents of the Tri-Cities to "advocate and lead a bold new strategy for Hanford that finally and fully acknowledges the harsh lessons of both the past decade and the past month." Gillenwater urged the Tri-Cities to clean up the site while developing and exporting new technologies; build regional unity in favor of the cleanup mission; and work to reduce DOE's role at Hanford and in the Tri-Cities. In September, Westinghouse Hanford President Roger Nichols told nearly 9,000 Westinghouse employees it was time to stop thinking of Hanford cleanup as "suck, muck and truck." He encouraged workers to take pride in their past accomplishments in the nation's defense, but also to acknowledge those days were over.

The fight over whether to save or dismantle the Fast Flux Test Facility (FFTF) continued. FFTF was a nuclear test reactor, cooled by liquid sodium. It was built to support liquid metal reactor technology, conduct reactor safety research, and demonstrate technology for breeder reactors. DOE abandoned the liquid metal reactor program and the reactor lost its primary mission before it began operations in 1982. During the next decade the FFTF tested advanced nuclear fuels, materials, and safety designs. It also produced a large number of different medical isotopes. A team looking at new missions for FFTF presented its report to Washington Governor Booth Gardner in June. The conclusion was that FFTF needed a combination of missions to be financially viable.

"You put me and other governors in an untenable position. We have supported — strongly — needed appropriations for waste cleanup…But when the sum of your actions is to submit a budget that is less than what you say the job will cost…what is it we are to believe or support?"

– Letter from Oregon Governor Neil Goldschmidt to Energy Secretary James Watkins. (July 7, 1990).

"What other business do you know of that comes with a 30 year guarantee and a minimum $25 billion investment?"

– Energy Assistant Secretary Leo Duffy, during a visit to Hanford. (*Tri-City Herald,* September 12, 1990).

"We can't make headway in restoring the physical environment unless we restore the mental environment first."

– Westinghouse Hanford President Roger Nichols, who told Westinghouse employees to accept that plutonium production days were over. (*Tri-City Herald,* September 25, 1990).

Inside PUREX. ►

"Saying that plutonium production at PUREX is needed for environmental cleanup is like saying we need crack houses to fight drug addiction."

– Scott Saleska, co-author of a Hanford Education Action League study which urged that PUREX remain shut down. (*Seattle Post-Intelligencer*, July 11, 1990).

"USDOE admits that the Department of Defense might want as much as one-seventh of N Reactor's remaining nuclear fuel to be processed for weapons grade plutonium. To that extent, running PUREX is weapons production, not cleanup or waste management. If we are to believe the Secretary, weapons production now is contrary to Hanford's new strategic mission."

– Michael Grainey, Deputy Director, Oregon Department of Energy, in testimony before Oregon Senator Mark Hatfield. (August 22, 1990).

A processing run at PUREX was completed early in 1990 and preparations began for a shutdown. A one year outage was planned to prepare for processing 2,100 metric tons of N Reactor spent nuclear fuel stored in basins at the K Reactors for more than 25 years. That plan quickly came under attack. First, a General Accounting Office (GAO) report said DOE's plans to restart PUREX were inadequate and provided no assurances the facility could be operated safely. The report also said DOE had not demonstrated a need for weapons-grade plutonium from PUREX. In July, the Hanford Education Action League released a study urging that PUREX remain shut down. The report said restart of the plant was unsafe, environmentally dangerous, and expensive.

In August, the State of Oregon, in testimony before Oregon Senator Mark Hatfield at a hearing in Pendleton, formally opposed restart of PUREX. In October, Energy Secretary James Watkins, in a joint announcement with Senator Hatfield, said PUREX would not reopen for further production of weapons-grade or fuel-grade plutonium. Watkins said the plant would be placed on standby for at least two years while DOE studied whether the facility should be restarted to process the N Reactor fuel. Other options for treating and disposing of the fuel would also be examined in an Environmental Impact Statement.

The GAO said nearly two-thirds of 294 health and safety problems cited at Hanford since 1986 remained unresolved. The report said DOE and its contractors had been slow to correct health and safety problems at most DOE sites.

Energy Secretary Watkins sent a "Tiger Team" of investigators to Hanford. The Tiger Team spent two months beginning in May

examining Hanford's operations, including its environmental, safety and management practices. The investigation found low morale and a lack of management oversight. The Tiger Team report concluded that while management and safety practices were improving, numerous problems still existed.

In July, Mike Lawrence resigned as Hanford Manager, saying he had peaked in government service. Many speculated he was forced out as a result of Secretary Watkins' unhappiness with Lawrence's blunt discussion of risks from Hanford's tanks. John Wagoner, Deputy Manager at DOE's Savannah River Site, was appointed interim Hanford Site manager (a position he held for 17 months, until his permanent appointment in December 1991). DOE also announced the creation of three new deputy manager positions at Hanford and said Wagoner would report directly to Leo Duffy, director of DOE's waste management and environmental restoration programs. The changes made Hanford management less autonomous and more accountable to DOE Headquarters.

While considerable attention focused on the possible immediate threat of a tank explosion or fire, there was also a new focus on the problem caused by waste leaks from a number of the tanks. Hanford's first underground waste storage tanks were built in 1944 and were expected to last from 10-20 years. Within that time period — in 1956 — the first tank leak was suspected and then confirmed in 1959. Despite other confirmed tank leaks in subsequent years, it was not until November 1980 that a ban on adding new waste to the single-shell tanks was put in place. In all, 67 single-shell tanks had been declared or suspected of leaking. Some tanks had

◀ ***Construction of the A Tank Farm, 1954.***

"…the Hanford Site is on a positive improvement slope, but far from achieving expectations or excellence. Improvements are being made, but slowly...The Tiger Team found many deficiencies that need management's attention; attention not only to correct the noted deficiencies, but to identify why the deficiencies exist and to correct the root cause."

– Tiger Team Assessment of the Hanford Site. (July 1990).

"Mike's willingness to open some of the old closets and let the skeletons out got him in trouble with some folks."

– Washington Congressman Sid Morrison, on the resignation of Hanford Manager Mike Lawrence. (*Tri-City Herald,* July 7, 1990).

"The loss of Mike Lawrence is a substantial one….most important, he was and is trusted…The errors of the past…came to light at least in part because of his work within government to make them available."

– *Tri-City Herald* Editorial. (July 7, 1990).

"Today we still have a management regime that is largely based on production of special nuclear materials. That is not our goal out there anymore."

– Energy Secretary James Watkins, explaining management changes at Hanford and within DOE Headquarters. (*Tri-City Herald,* July 12, 1990).

leaked more than once. The total amount of waste leaked was estimated at just over 1,000,000 gallons of high-level waste.

In October, DOE officials said tank A-105 may have leaked more than 1,000,000 gallons of contaminated water into the ground over a nine or ten year period starting about 1968. DOE contractors added hundreds of thousands of gallons of water to the tank to cool hot radioactive sludge in the bottom. That water leaked out of a ruptured tank seam. Previous leak estimates for the tank had been about 5,000 gallons. Westinghouse officials also said at least 780,000 gallons of waste were added to tank SX-108 in 1963 and 1964 and another 150,000 gallons of cooling water added to the tank between 1963 and 1967, even though the tank had leaked in 1962. All remaining liquids were pumped out of the tank in 1980.

Plans for Hanford's vitrification plant — to immobilize Hanford's high-level tank waste — started off the year in good shape. By the end of the year, however, the project was showing serious signs of trouble. In March, Westinghouse Hanford officials said detailed design was underway and construction of the vitrification plant was on schedule to start in July 1991. The facility was to be built in the 200 East Area near B Plant. By August, Energy Assistant Secretary Duffy told a Senate Committee that DOE was re-evaluating its schedule for a high-level waste vitrification plant at Hanford. Duffy followed those comments by telling state officials in September that tank safety issues might delay construction and operation of the vitrification plant. That became official in December, when Hanford Manager Wagoner notified the Washington Department of Ecology in writing that technical and programmatic concerns might delay the start of construction of the vitrification plant.

During a visit to Hanford, Energy Secretary Watkins said Hanford employment would increase from 14,000 to 15,000 in the coming two years as cleanup work increased. He also met with Washington Governor Gardner and announced plans for accelerated clean-up of three sites.

The independent scientific panel directing studies into past releases of radioactive materials from Hanford issued results from the first phase of its study. The results showed thousands of Northwest residents may have been exposed to radioactive materials released from Hanford between 1944 and 1971. The panel supported a thyroid epidemiological study.

Westinghouse Hanford suspended two employees for disabling a safety alarm at T Plant.

"This is the first direct statement from a top-level DOE official where they said they're going to miss a major milestone."

– Terry Husseman, Ecology Assistant Director. (*Tri-City Herald,* September 16, 1990).

"DOE is further committed to providing the necessary support for maintaining the current schedule for initiating hot (radioactive) operations in December 1999, should the risk assessment indicate that the current vitrification program is technically and programmatically viable."

– Letter from Hanford Site Manager John Wagoner to Washington Ecology Director Christine Gregoire. (December 12, 1990).

"As we move ahead with carrying out our environmental and waste management mission, we're going to weed out people who blatantly disregard procedures that can affect safety and environmental quality."

– Roger Nichols, Westinghouse Hanford President, on the suspension of two employees. (Westinghouse News Release, November 9, 1990).

Tank Safety

Tank safety issues continued to draw considerable attention throughout the year. In January, Washington state officials concluded that ferrocyanide in Hanford's tanks did not pose a serious risk of

explosion. The Defense Nuclear Facilities Safety Board (DNFSB) came to the same conclusion in March and a DOE team reached the same conclusion by July — that there was little, if any, near-term likelihood of an explosion. The team recommended Westinghouse conduct additional temperature monitoring of the affected tanks. In October, the GAO agreed that the risk of an explosion was low but also concluded that the consequences of such an explosion would be considerably more severe than DOE estimated. The report concluded that not enough was known about the waste in the tanks to rule out the possibility of a spontaneous explosion.

A new potential risk was identified in March — a buildup of hydrogen. Hanford officials initially characterized the risk as low but admitted they needed more information. The DNFSB, an independent, federal advisory board with external oversight responsibilities at DOE's nuclear weapons facilities, recommended DOE develop a program for continuous monitoring of conditions in those double-shell tanks.

In April, the first team of outside experts arrived at Hanford to study tank safety issues. They were followed by a 16 member DOE Advisory Committee on Nuclear Facilities Safety, which arrived at Hanford in June to review tank safety issues.

In April, hydrogen vented from tank SY-101, located in Hanford's 200 West Area. Samples collected during the venting showed the hydrogen concentration at 3.4 percent, below the 5 percent needed for flammability. Chemical reactions in the tank's waste created hydrogen, which was trapped in the solids at the bottom of the tank.

"The worst case is any explosion that could cause the dome to collapse and send the contents up to the air. I can't sit here and say it's not going to happen."

– Hanford Site Manager Mike Lawrence, commenting on a concern about hydrogen building up in some of Hanford's waste storage tanks. (*Tri-City Herald,* March 24, 1990).

"That was Lawrence's statement, that's not our statement. I'm sorry it was said that way."

– Energy Secretary James Watkins, chastising Hanford Manager Mike Lawrence for his statements about the risk of a tank explosion. (*Tri-City Herald*, March 29, 1990).

"There is good evidence the tank system could withstand what could occur in there. The consequences are far less than we thought."

– Hanford Manager Mike Lawrence. (*Tri-City Herald,* April 17, 1990).

◀ ***The Crust inside tank SY-101.***

"There is an urgent need to determine what is in the tanks, what are the risks, and what actions should be taken to ameliorate the hazards…the operators have only sketchy information on conditions in the tanks."

– Conclusions of the Energy Department's Advisory Committee on Nuclear Facility Safety. (*New York Times*, July 31, 1990).

"..the worst credible accident might damage the primary steel tank wall but not the secondary steel tank wall or reinforced concrete vault."

– DOE conclusions on Tank SY-101. (DOE News Release, April 11, 1990).

"Energy must punish those who obscure or ignore safety problems. Our public, and us, continue to ask, how many more surprises can we expect?"

– Washington Department of Ecology Director Christine Gregoire, testifying at a hearing of the Senate Governmental Affairs Committee which was exploring Hanford's tank safety issues. (*New York Times*, August 1, 1990).

"If an explosion did occur… it would be a major accident, with…contamination of large areas within and possibly beyond the Hanford Site boundaries…The force of this explosion would blow a large hole in the tank top and its overburden of earth."

– General Accounting Office Report. (GAO/RCED-91-34, October 1990).

When enough hydrogen gas was generated, it forced its way up and into the open space of the tank. The concern was that during these hydrogen "ventings," which came to be known as tank "burps," the hydrogen concentration would be high enough to burn or explode if there was a spark inside the tank. These ventings occurred every 100 days or so. Hydrogen concentrations during an August venting were even lower, at 1.1 percent.

A team of technical experts organized by DOE Headquarters concluded that the probability of combustion inside tank SY-101 was low but agreed that additional study was needed.

A DOE report issued in July showed Hanford contractors had known about hydrogen in the tanks for 13 years, but had done nothing to resolve the problem. The report concluded that management actions necessary to ensure an adequate level of safety were lacking.

Energy Secretary Watkins directed that additional safety measures and operational restrictions be taken to reduce the risk associated with gas generation and accumulation within the tank. He also said DOE would prepare a supplemental Environmental Impact Statement to determine potential environmental impacts from Hanford's tanks. Watkins said the action should not be misconstrued as an indication of increased risk to the public — but a confirmation of DOE's commitment to protect the environment.

By year's end, samples were taken from the crust inside tank SY-101. The crust was found to be damper, softer and less radioactive than expected. Further analysis showed the crust contained up to 25 percent water and might be too wet to burn.

Nevertheless, the DNFSB said DOE and its contractors were not moving fast enough to address tank safety issues. The DNFSB said DOE's actions did not reflect the urgency the circumstances merited. The Board recommended DOE take immediate steps to add instruments to the single-shell tanks containing ferrocyanide to establish whether hot spots existed or may develop. DOE was also advised to determine if flammable gas was present in the tanks and to greatly accelerate sampling of the tanks.

The State of Oregon weighed in on the issue in October. In a letter to Energy Secretary Watkins, Oregon Hanford Waste Board Chair William Schroeder and Vice Chair and Secretary of State Barbara Roberts requested that DOE immediately begin a thorough study of any environmental or public health and safety impacts to Oregon from a tank explosion.

Safety concerns caused DOE Headquarters to order a stop to coring work inside Hanford's tanks. Experiments indicated drill bit temperatures could reach 475 degrees Celsius, well above the temperature needed to create a fire in the tanks under certain conditions.

Around the DOE Complex

Energy Secretary Watkins announced a proposed DOE rule to protect whistleblowers working for DOE contractors. DOE employees already had legal protection against retaliation but their contractor employees were not previously protected from retaliation for reporting unsafe, wasteful or illegal practices.

Watkins also announced his master plan for producing nuclear weapons into the middle of the next century. Hanford was not initially considered to be a favorite to host any facilities as part of "Complex 21."

"We must protect these people so they will feel free to come forward with their good-faith concerns."

– Energy Secretary James Watkins. (DOE News Release March 7, 1990).

Construction of Hanford's BC Cribs in 1955.

"Western governors agree that continued reliance on temporary storage facilities for these wastes is unacceptable, but these shipments must be accomplished in the safest manner possible and in partnership with the impacted states."

– Oregon Governor Neil Goldschmidt. (DOE News Release, July 17, 1990).

"We believe USDOE must not be allowed to play one state or one region off against another in the ranking of cleanup sites and for priority claims on cleanup dollars. Hanford should not have to compete against Savannah River. Oak Ridge should not have to compete against Rocky Flats. None of these and other contaminated sites should be sacrificed so that USDOE can continue (to spend money on) weapons production."

– Michael Grainey, Deputy Director, Oregon Department of Energy, at a public hearing on DOE's Programmatic Environmental Impact Statement. (December 11, 1990).

DOE and the Western Governors' Association signed a cooperative agreement in which DOE would provide funding to 10 Western states to address transportation issues related to the shipment of radioactive wastes from DOE sites — including Hanford — to the Waste Isolation Pilot Plant in New Mexico. The states would work with DOE over the coming years to develop a comprehensive tranportation safety plan addressing accident prevention, emergency preparedness, and public information.

In October, DOE announced it would conduct a Programmatic Environmental Impact Statement to examine planned environmental restoration and waste management operations throughout DOE's nuclear weapons production complex. The environmental analysis would specifically address long-term goals and issues summarized in DOE's five year plan.

"This mulberry jam is a token of the future hazard of unidentified, uncontained and unmanaged radioactivity at Hanford."

– Letter from Norm Buske, who picked mulberries containing strontium 90 near Hanford's N Reactor, made jam, and then sent jars of the jam to Washington Governor Booth Gardner and Energy Secretary James Watkins. (*Tri-City Herald,* August 8, 1990).

"They're no longer cute little dogs, they're just a radioactive waste problem."

– Bern Shanks, University of California at Davis, referring to the carcasses of 828 dead beagles shipped to Hanford for burial. They were part of a study on radiation exposure effects at the University of California at Davis. (*Tri-City Herald*, October 16, 1990).

1991

***"We are not trying to drag our feet…
But we have to wean ourselves of the notion that
we can clean it up by throwing money at it."***

– Energy Secretary James Watkins at a House subcommittee hearing, saying continued disputes with the State of Washington are likely over cleanup schedules. (*Tri-City Herald* March 7, 1991).

The Cleanup

As 1991 rolled around, it had been just 14 months since the U.S. Department of Energy (DOE) had awarded a construction contract to build Hanford's high-level waste vitrification plant and construction was scheduled to begin within a few months. But it was not to be. In January, Energy Secretary James Watkins announced delays of two years or more for Hanford's vitrification plant and pre-treatment plant. By March, a Westinghouse Hanford official said the delay might be significantly longer than two years. Technical, safety and budget issues were blamed. DOE also wanted to learn some lessons from the vitrification plant being built at the Savannah River Site. After repeated delays, that facility was now expected to be operational in December 1993.

The regulators were not initially willing to accept major delays. Washington Governor Booth Gardner threatened legal action. Washington Department of Ecology and U.S. Environmental Protection Agency (EPA) officials wrote to Hanford Manager John Wagoner, rejecting DOE plans to delay construction of the vitrification plant. The regulators did agree to delays in pumping liquids from the single-shell tanks because of safety issues.

Negotiations among the three parties led to agreement on revisions to the Tri-Party Agreement in May. They were the first changes since the agreement was signed two years earlier. The start of construction of the vitrification plant would be delayed by 10 months to April 1992, but the operational date of December 1999 remained the same. Up to four new double-shell tanks could be constructed to allow more flexibility in handling high-level waste. Ecology and EPA would be allowed increased involvement in preparing Hanford's annual funding estimates. The parties also agreed to a delay in pumping liquids from the single-shell tanks. A strategy to streamline cleanup was also agreed to in which the schedule for investigating and developing alternatives for old waste sites was reduced to three to four years (from the previous seven to nine years).

By November, an internal DOE study suggested further delays in Hanford's high-level waste vitrification plant might be unavoidable.

"It's astonishing that Energy would unilaterally let such a major milestone slip. The (Tri-Party) agreement is very clear: changes are to be proposed and discussed out in the open, and not pulled like a rabbit out of a hat."

– Dana Rasmussen, EPA Northwest Regional Administrator, responding to Energy Secretary James Watkins' letter announcing at least a two year delay in the pre-treatment and vitrification plant. (EPA News Release, January 31, 1991).

"This is not an issue that can be decided unilaterally. Every unjustified delay and every cut in the cleanup budget puts the Columbia River and the people of Oregon and Washington at greater risk. That simply is not acceptable."

– Oregon Governor Barbara Roberts. (Governor Roberts' News Release, January 31, 1991).

Hanford's B Plant. ►

"Several state officials have raised these concerns…about the adequacy of the B-Plant at Hanford, which is needed to support it. It now appears that the B-Plant will not be able to meet standards enforced by the Washington Department of Ecology, and a new plant may need to be built."

– Energy Secretary James Watkins. (DOE News Release, February 1, 1991).

"I was surprised to learn of recent articles in the Washington press which implied that DOE was reneging on the (Tri-Party) Agreement, I assure you that is not the case."

– Letter from Energy Secretary James Watkins to Washington Governor Booth Gardner. (January 30, 1991).

"People may be shocked by the volume of wastes."

– Ron Gerton, DOE, after DOE announced plan to publish a report explaining the history behind all of Hanford's 1,400 waste sites. (*Tri-City Herald*, March 12, 1991).

"My guess is that the public probably wasn't aware that tank wastes were discharged into the soil."

– Paul Day, U.S. Environmental Protection Agency. (*Tri-City Herald*, March 12, 1991).

Those further delays did not bode well for the continued integrity of Hanford's waste storage tanks. In July, a DOE report indicated that Hanford's double-shell tanks could start leaking before DOE was able to remove wastes from the tanks for treatment and vitrification. The report said the oldest of the double-shell tanks were fast approaching the limit of their expected operating life.

Throughout the year, Ecology opposed DOE's plans to use the World War II-era B Plant for pre-treatment of tank waste. In March, Ecology Director Christine Gregoire asked for help from the state's Congressional delegation to get DOE to come up with a new solution for pre-treatment. Gregoire said B Plant could never comply with hazardous waste laws. That summer, a General Accounting Office report agreed with Washington, saying DOE should cancel $609 million in projects designed to make B Plant a waste treatment facility. The report said B Plant did not meet current regulatory standards and the state was unlikely to waive these standards. In December, DOE agreed to drop plans to use B Plant for pre-treatment of Hanford's tank waste.

The first Superfund cleanup work began at Hanford in February. The project was to recover about 100 steel drums containing toxic chemicals and uranium from a 300 Area burial site, less than one mile from the Columbia River.

EPA officials meanwhile, urged DOE to accelerate efforts to stop seven liquid waste streams. They were joined by Ecology officials in demanding severe restrictions on liquid discharges to Hanford's soil.

Attempts to identify the scope of the cleanup ahead began to uncover the magnitude of the contamination at Hanford. In March, DOE announced plans to publish a report explaining the history behind all of Hanford's 1,400 waste sites.

In April, DOE announced that 444 billion gallons of contaminated liquids were dumped into the soil at Hanford since operations began in 1944. It was the first attempt to estimate the total volume of radioactive materials and chemicals dumped or buried at Hanford. The waste

discharges were estimated to have contained about 678,000 curies of radioactivity and 93,000 tons of chemicals. About 121 million gallons of tank waste were dumped to the soil. In May, a Westinghouse Hanford report showed 75 containers of spent fuel rods were placed in a low-level burial site in the mid-1970s.

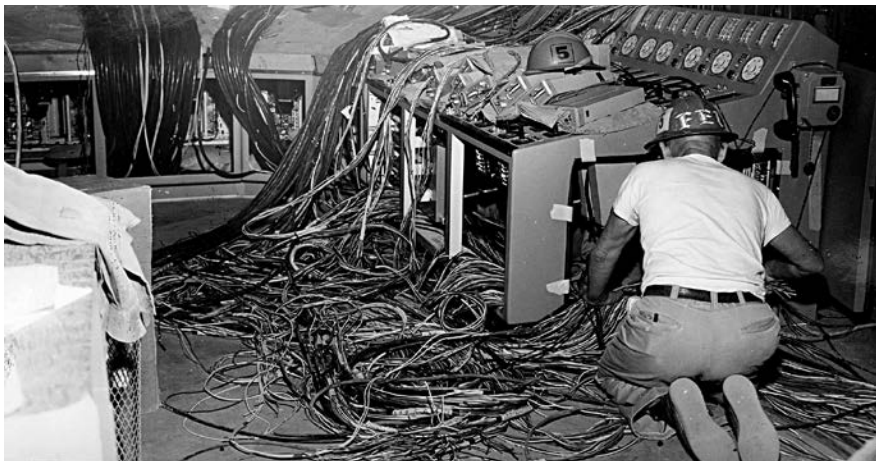
DOE awarded a two year contract extension to Westinghouse Hanford Company in June and announced changes in site management, including the addition of a separate contractor to manage environmental restoration work.

In July, Westinghouse announced it had successfully demonstrated the ability to extract carbon tetrachloride from the soil. The demonstration was part of an expedited cleanup action but would be expanded to a full-scale project. More than two million pounds of carbon tetrachloride were discharged to the ground near the Plutonium Finishing Plant between 1955 and 1973. The chemical had since spread over a seven square mile area of the soil and groundwater. The vapor extraction process was designed to intercept the chemical before more of it reached the groundwater.

A survey conducted for the Tri-Party agencies showed Washington and Oregon residents were interested in cleanup work at Hanford, but many doubted whether they actually had any input in the cleanup decisions. Sixty three percent of the poll respondents said they did not believe Hanford officials were interested in public participation in Hanford cleanup decisions. About 51 percent said they were very, or somewhat interested in helping make decisions about Hanford.

Meanwhile, a survey done for the Oregon Department of Energy found that most Oregonians worried about the effects of nuclear waste transport, but more than half believed the job could be done safely. More than half of those surveyed also believed nuclear weapons waste transport posed a greater risk than continuing to store the waste at Hanford. As part of the Hanford cleanup and other DOE site cleanups, large volumes of waste were expected to be transported both to and from the Hanford Site.

The end of Hanford's plutonium production days seemed assured in August, when Energy Secretary Watkins announced N Reactor would be permanently shut down.



◄ *A technician wires the N Reactor Control Room in 1963.*

"The report re-emphasizes that the contamination at Hanford far exceeds what anyone thought it was, and that cleanup is going to be a lot bigger."

– Lynn Stembridge, Hanford Education Action League, commenting on a report that 444 billion gallons of contaminated liquids were dumped into Hanford's soils. (*Seattle Post-Intelligencer,* April 13, 1991).

"The volume of carbon tetrachloride disposed to the ground is unprecedented in the environmental cleanup industry… nobody has ever attempted to use (the technology) to clean up a vapor plume this big."

– Mike Hagood, Westinghouse Project Manager. (Westinghouse Hanford News Release, July 1, 1991).

"Our intent is not to change people's minds about nuclear waste shipments, although that might happen. (Our) task is to provide accurate, timely, and credible information about safe transport. Then Oregonians can make informed judgments about the Hanford nuclear weapons waste cleanup and radioactive waste transport."

– David Stewart-Smith, Oregon Department of Energy. (Oregon Department of Energy News Release, February 8, 1991).

"I have determined that it is no longer necessary to continue preservation of N Reactor as a contingency for the production of defense nuclear materials."

– Energy Secretary James Watkins.
(DOE News Release, August 14, 1991).

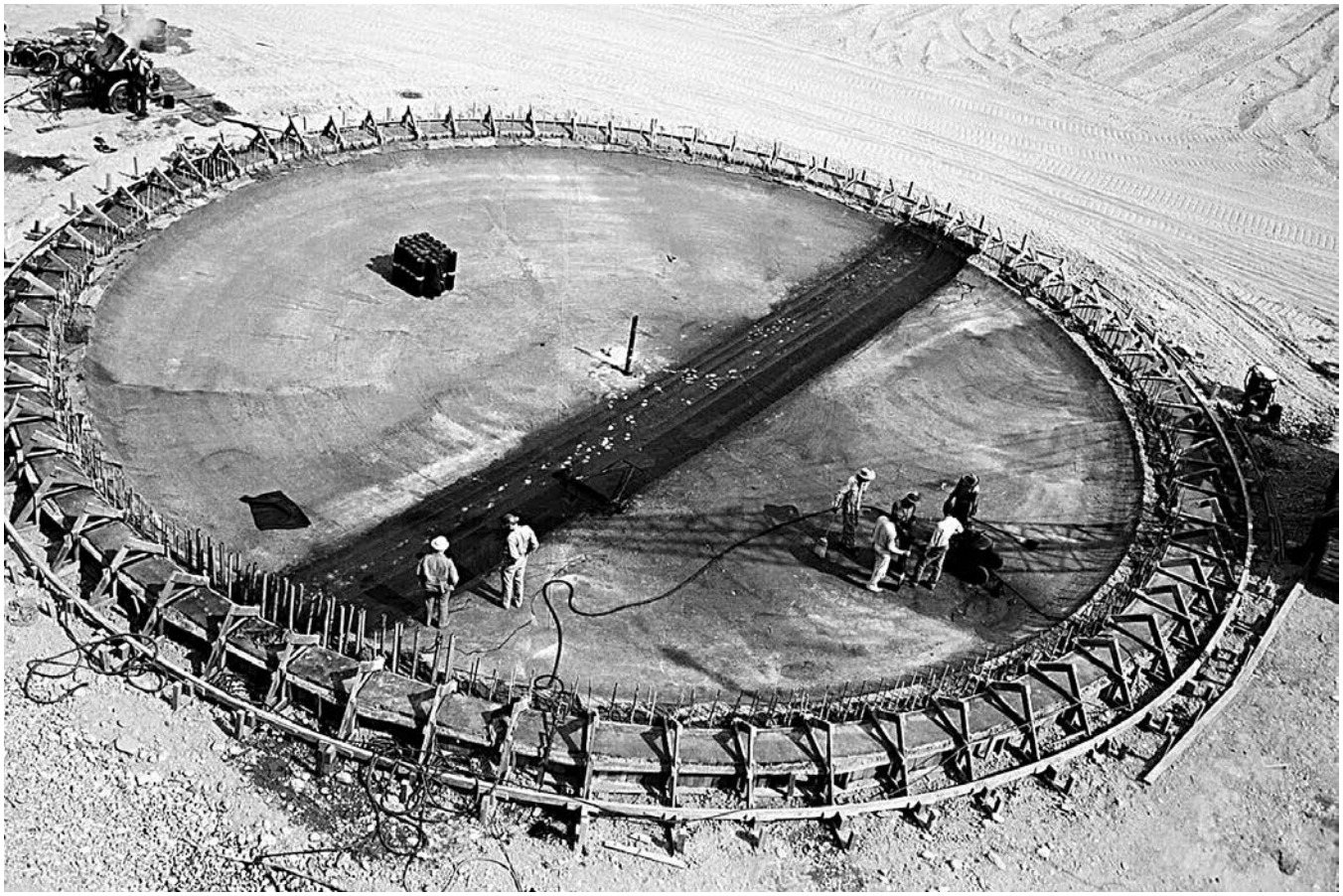
In October, empty barrels marked "radioactive" and some also marked "Hanford" were discovered in the Columbia and Willamette Rivers. The ten barrels were found near downtown Portland and near Rainier, 45 miles downriver. The barrels were empty and were apparently some type of protest. No one claimed responsibility.

The Advisory Committee on Nuclear Facilities Safety (known as the Ahearne Commission, after its chair, John Ahearne), issued its final report in October. The report said worker safety at the tank farms remained an issue and DOE should not create new environmental restoration management contractors at Hanford or at other DOE sites. It also said DOE's goal to clean up the nuclear weapons complex by 2019 was "unattainable."

In December, John Wagoner was named Manager of the Hanford Site, removing the "acting" tag that had been part of his title for the previous 17 months.

Tank Safety

Concerns about the safety of many of Hanford's underground storage tanks prompted Oregon Congressman (now Senator) Ron Wyden to propose legislation to create a "Watch List" of tanks. Tanks on the Watch List were subject to special safety precautions because of the



Construction of Hanford's BX Tank Farm, March 1947. ▼

potential for a fire or explosion. There were four issues of concern: hydrogen, ferrocyanide, organics and high heat:

- hydrogen was generated through chemical reactions in the tank waste. At certain concentrations, hydrogen was flammable. At higher concentrations it was explosive.
- about 350 tons of ferrocyanide was added to two dozen tanks in the early 1950s to separate cesium from the waste. Under high temperatures and at certain concentrations, ferrocyanide could explode.
- more than five million pounds of organic chemicals was added to the tanks, mainly as a result of efforts to remove strontium from the wastes. At certain concentrations and at certain temperatures, organics could ignite.
- radioactive decay in the waste could create temperatures great enough to cause the waste to boil. If the tank was to leak, adding cooling water could increase leakage to the soil. If cooling water was not added, the waste could heat enough to cause structural damage to the tank, possibly leading to a large release to the environment.

In all, 52 of Hanford's 177 underground waste storage tanks (47 single-shell and five double-shell) were placed on the initial Watch List. Some tanks were on more than one list. A few additional tanks were added to the Watch List later in 1991, in 1992, 1993 and 1994. No tanks were added to the Watch List after May 1994.

A Westinghouse Hanford Company report concluded that Hanford's waste storage tanks did not contain "red oil," an organic-based material that could potentially detonate at relatively low temperatures.

In March, DOE and Westinghouse released a list of 27 tank safety problems, including the four issues which resulted in creation of the Watch List. Other problems included a lack of available tank space, a lack of accurate information about the tank contents and aging leak detection and alarm systems.

New core samples were taken from tank SY-101 after a venting of hydrogen in May. A video camera and light were installed to monitor activity inside the tank and a radar device was also installed to track the level of waste in the tank.

DOE officials in June announced that the amount of plutonium in tank C-104 exceeded safety limits. The concentration of plutonium was still low enough that a criticality was not likely.

The following month, DOE officials announced they could not pump the contents of tank C-106 if it began to leak. Their only option was to add water to keep the temperature of the waste from getting too high. Adding water to the tank, if it was leaking, would drive the waste towards the groundwater.

Hanford's updated Five-Year Plan, released in September, listed the threat of a fire or explosion in the underground waste tanks as the Site's top concern. Resolution of all tank safety issues was listed as DOE's highest priority at Hanford.

"I don't know why the tank farms had a low priority. But they did not get the attention or the budgeting the rest of the site did."

– Phil Hamric, Hanford Deputy Manager, in announcing that DOE planned to spend $25 million over the next four to five years to replace outdated safety monitoring instruments and alarms at most of the tanks. (*Tri-City Herald,* January 31, 1991).

After a year's delay because of tank safety issues, Westinghouse started taking samples from the single-shell tanks to gain a better understanding of the waste contents.

"Oregon is not prepared or even willing to think about new production facilities. And we will not contemplate that fool's lottery until USDOE has earned at least a measure of credibility and public trust. When USDOE pursues environmental restoration with the same will and commitment with which it always has pursued weapons production, half the battle will be won."

– Oregon Secretary of State Phil Keisling, at a DOE Hearing on New Production Reactor Capacity. (May 31, 1991).

"USDOE should construct its budget based upon the regulatory requirements and agreements it has reached with the states and Indian tribes, and with other requirements of federal, state and tribal law. These agreements reflect the value judgments of socio-economics, public health and safety, and other concerns that USDOE is trying to arbitrarily quantify."

– Letter from Michael Grainey, Deputy Director, Oregon Department of Energy, to Energy Assistant Secretary Leo Duffy. (November 5, 1991).

Around the DOE Complex

In February, DOE released the results of a study to define the nation's nuclear weapons production needs well into the next century. Energy Secretary Watkins said the new complex would be smaller and less expensive to operate. Production activities at Rocky Flats, Colorado would end. Costs of the new complex were estimated at $6.7 to $15.2 billion. Hanford was one of five sites listed as a potential new production site, although DOE officials said Hanford was not their first choice. During the summer, more than one hundred protesters demonstrated against consolidating nuclear weapon production facilities at Hanford as part of DOE's Complex 21 plans. It was the largest anti-nuclear protest at Hanford in years.

DOE released a draft Environmental Impact Statement in April for a new reactor for tritium production. Hanford was one of three sites under consideration.

A study by the Congressional Office of Technology Assessment showed cleanup of DOE's nuclear sites might take much longer than 30 years.

DOE sought public comments on a formal system designed to help establish priorities for environmental cleanup at its sites and facilities. The intent was to help determine which cleanup activities to conduct first and how much money to budget.

In November, Energy Secretary Watkins announced a seven point American Indian policy. Among the commitments was a pledge for prior consultation with tribes where their interests or treaty rights might be affected by DOE activities. Three Northwest tribes were recognized by Congress as being affected by Hanford operations. The Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, and the Yakama Indian Nation all had rights recognized and guaranteed in the Treaties of 1855. The Wanapum, who still lived adjacent to the site, were a non-federally recognized tribe that also had strong cultural ties to the site and were consulted on cultural resource issues. Tribal people routinely accessed portions of Hanford for traditional religious practices, including the gathering of foods and medicines.

"The methodology appears to be scientific and unbiased, but in fact it is not…There is only the illusion of scientific certainty and objectivity."

– Final Report of the Advisory Committee on Nuclear Facilities Safety, referring to DOE's method of setting budget priorities for cleanup. (*Tri-City Herald,* November 11, 1991).

1992

"We aren't in control of the tank, it's kind of in control of us."

– Phil Hamric, Hanford Deputy Manager, referring to tank SY-101. (*Tri-City Herald,* October 10, 1992).

The Cleanup

The Bush Administration requested a $1.7 billion Hanford budget for fiscal year 1993. It represented a 17 percent increase over the current budget and allowed the vitrification plant to remain on schedule for a 1999 startup. For a short time, at least, there appeared to be progress toward meeting that startup, as groundbreaking ceremonies were held in May to mark the beginning of construction of the vitrification plant.

The U.S. Department of Energy (DOE) released a report detailing 127 significant accidents at Hanford that occurred over the previous four decades, many of which had previously been made public. They included fires, explosions, fuel melting, safety system failures, and various incidents that exposed workers to radiation and dangerous chemicals. Fourteen of the 127 accidents were considered Category 1, the most serious. These involved serious injury, radiation release or exposure above limits, substantial damage or more than $1 million in damage. Four of the Category 1 accidents involved reactor operations, seven were related to chemical processing, and three to laboratory or experimental operations. Chronic or repetitive radioactive material releases were generally not included in the report.

A survey by the Hanford Reach newspaper showed many workers were still afraid to raise safety concerns. About 20 percent of the respondents said they did not believe they could raise safety concerns without suffering some retaliation.

Washington Department of Ecology officials in February rejected DOE's plans to use commercial laboratories for low-level mixed waste sampling instead of building their own facilities at Hanford. Ecology officials cited delays in getting results — sometimes as long as five to seven months past deadlines. The sampling was needed to support cleanup work. Later in the year, construction began to expand Hanford's hot cell capabilities. Five analytical hot cells were being added, which were needed to keep up with cleanup.

DOE made some important decisions about two of its major facilities. In March, DOE ordered the Fast Flux Test Facility into a standby mode, effective April 1. The reactor was already scheduled for shutdown for routine maintenance and refueling. In December,

"The budget request for environmental restoration projects, waste operations and research and technology development reflects a deep concern for the environment, as well as a tangible sign of the immense job that lies before us."

– Energy Secretary James Watkins. (DOE News Release, January 29, 1992).

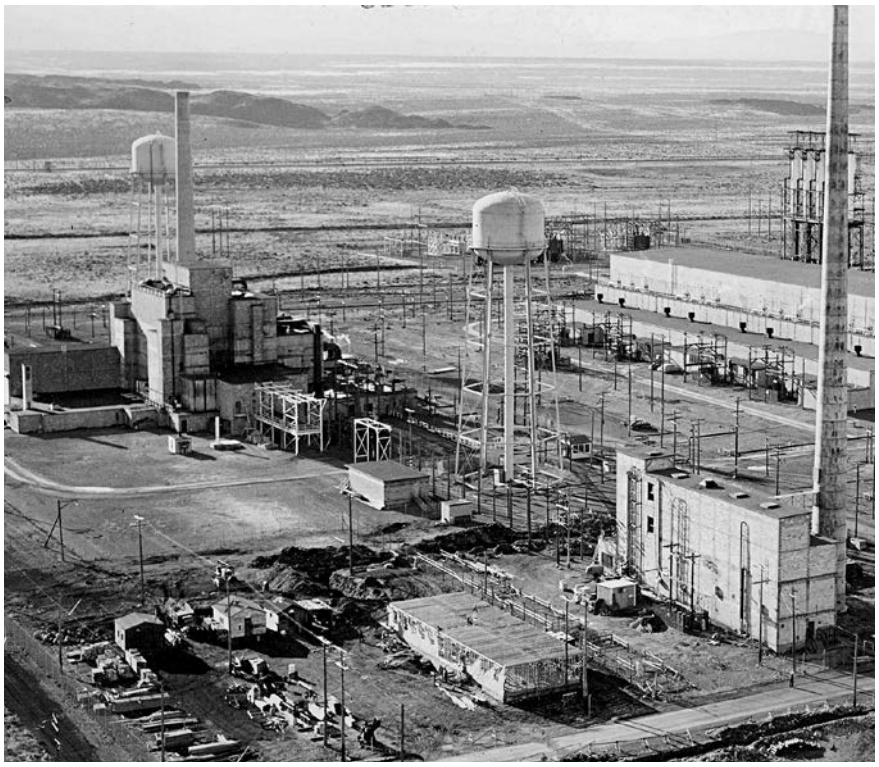
"No way is the government going to keep spending billions and billions at Hanford over so many years just to clean up some desert land. The government doesn't have a history of sticking with something that long."

– Tom Anderson, Westinghouse Hanford President, in a speech to employees. Anderson challenged workers to demonstrate and apply advanced technologies in their cleanup work as he said cleanup was not enough to maintain continued funding. (February 9, 1992).

"Our fellow citizens must know the stakes involved in a successful Hanford cleanup, as well as the perils of mistakes."

– Oregon Secretary of State Phil Keisling, reading Governor Roberts' charge to the Oregon Hanford Waste Board. (February 18, 1992).

Hanford's B Reactor. ▶



"That option is not viable because the plant does not meet current environmental requirements for operation and the cost of bringing it into compliance is, at nearly one billion dollars, simply too expensive."

– John Hunter, DOE Assistant Manager for Operations at Hanford, stating that PUREX would not be restarted to process N Reactor fuel stored at the K-Basins. (DOE News Release, December 4, 1992).

"PUREX has been an important cog in a nuclear weapons machine that has no appropriate place in today's world. Oregon applauds this decision. It underscores the U.S. Department of Energy's intent to keep Hanford out of the weapons production business."

– Oregon Governor Barbara Roberts. (Oregon Department of Energy News Release, December 8, 1992).

"Existing programs receive limited funding, operate with out-of-date and un-calibrated equipment, and are not comprehensive enough to assess the migration of contaminants from tanks or in the ground."

– A General Accounting Office Report, which criticized existing soil monitoring programs at Hanford and said DOE needed to improve and integrate these programs. (GAO/RCED-92-149, July 1992).

Energy Secretary James Watkins announced the permanent closure of the PUREX facility.

Tragedy struck in April and again in June. First, Hanford worker Miles Fisher was killed when he plunged through the roof of F Reactor and fell 50 feet to a concrete floor. A June plane crash near the Yakima Firing Range killed Battelle scientists Richard Fitzner and Lester Eberhardt and their pilot.

B Reactor was listed on the National Register of Historic Places. B Reactor was the first of nine plutonium production reactors built at Hanford and one of three that began operation during World War II. DOE planned to eventually dismantle all of the reactors with the exception of B Reactor, which would potentially be preserved as a historic site and museum.

A DOE audit identified numerous hazards at Hanford's surplus buildings. Hazards included improperly marked radiation zones, unmarked drums of hazardous chemicals and rattlesnakes.

In April, DOE released a request for proposal for an environmental restoration management contractor, despite strong opposition from local governments, labor unions and the state's congressional delegation. The proposal included $185 million for environmental restoration work at Hanford in 1993.

Westinghouse announced five new projects for accelerated cleanup. Accelerated cleanup projects could bypass some studies required by federal environmental cleanup laws. Two earlier accelerated cleanup projects had been completed while a third was underway at that point.

DOE announced in July it was stepping up internal oversight of Hanford. The action was in response to a DOE Headquarters audit which showed Hanford management had not met Tiger Team recommendations that DOE officials spend more time on the site.

A 7,000 gallon leak from tank T-101 went unreported for four months because tank farm workers did not trust a malfunctioning leak detection device. Tank T-101 was declared Hanford's 67th leaking tank in October.

In what would later become the model for stakeholder involvement at Hanford, the Hanford Future Site Uses Working group conducted its first meeting in April. The group was charged with identifying a range of possible future uses for the site and to help advise cleanup activities to make those potential uses possible. The nine month planning effort involved 28 parties, including DOE, its regulators, the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the State of Oregon, environmental groups, agriculture, labor, economic development and others. The Working Group members agreed they would not seek consensus on a single vision for future site use and cleanup strategies. Instead, they suggested several potential uses for each of six geographic areas of the site. The Working Group also agreed on a common set of values to guide cleanup.

"How clean is clean? What gets cleaned first? What is the land going to be used for? When you tackle the big problems like this, you've got to answer these questions."

– Randy Smith, EPA, at the first meeting of the Hanford Future Site Uses Working Group. (*Tri-City Herald*, April 3, 1992).

"We used every aspect of the Hanford Reservation. We depended on the foods and the medicines, not only from the land, but from the river."

– Russell Jim, Yakama Indian Nation, saying that the needs of Native Americans should be considered first in deciding future uses of Hanford's land. (Associated Press, November 18, 1992).

The Hanford Site includes a large area of sand dunes. ▼

"I wasn't necessarily expecting a food fight, but I did think it would be difficult to come up with general findings, and that turned out not to be the case."

– Mark Drummond, President of Eastern Washington University and Chair of the Hanford Future Site Uses Working Group. (*Tri-City Herald*, December 23, 1992).

In December the Working Group released its report to the public. It included nine major recommendations related to Hanford cleanup, including: protect the Columbia River; do not cause additional harm through cleanup work or future development; restrict access to the 200 Area for at least 100 years after cleanup is complete; and place a priority on cleaning up those parts of the site which have high value for future use. The Working Group suggested that a range of future use options existed for most areas of the site. The process resulted in greater public participation in Hanford decision making.

Tank Safety

While it appeared that the likelihood of a fire or explosion within one of Hanford's tanks was much less likely than earlier feared —

Hanford worker at a tank farm. ▼

with the possible exception of tank SY-101 — it had become very clear that the condition of the tank farms was poor and continued to deteriorate. That was the finding in July of a DOE review of Hanford's tank farm operations. It also concluded that Hanford workers did not have equipment readily available to quickly respond to a tank leak.

Ecology officials announced that major monitoring systems at SY-101 did not work or were not reliable. The state wrote a notice of violation which said a leak from the tank could go or may have gone undetected for an extended period of time. Ecology inspectors found one leak detection device to be virtually useless, a second that had been malfunctioning for at least a month, and a third with radiation detectors that did not work.

In September, there was a large venting of hydrogen at tank SY-101, one of the largest in the tank's history. Waste levels in the tank dropped 10 inches in 10 minutes, and a pipe which held instruments to measure temperatures in the tank was severely bent. Westinghouse workers successfully removed the bent pipe in October.

A Los Alamos National Laboratory study concluded "red oil" did not likely exist in Hanford's waste storage tanks and therefore did not pose a hazard. Red oil is an organic-based material that could potentially detonate at relatively low temperatures. The report recommended further study to better understand the behavior of red oil in complex chemical environments such as Hanford's waste tanks.

"The existing tank farm operator training program consists of little more than the passing of 'tribal knowledge,' both good and bad, from senior operators to junior operators."

– A Defense Nuclear Facilities Safety Board report, which said many safety problems remained at Hanford's tank farms. (*Tri-City Herald*, July 25, 1992).

"There was substantial movement. You could see waves bouncing off sides."

– Melissa Rodewalk, Westinghouse spokeswoman, referring to the view inside tank SY-101 via video camera of a large venting of hydrogen. (*Tri-City Herald,* September 4, 1992).

Around the DOE Complex

After more than four years of debate and negotiation, Congress passed the Federal Facilities Compliance Act. President Bush signed it into law in October. Passage of this act had been a long-standing priority for Washington and Oregon. The Federal Facilities Compliance Act in effect subjected DOE (and other federal agencies) and its contractors to nearly the same enforcement sanctions under federal and state hazardous waste laws as any other private party or non-federal government entity. Previously, Washington state's efforts to ensure compliance with the Resource Conservation and Recovery Act (RCRA) were often frustrated at Hanford, as DOE claimed sovereign immunity and successfully blocked state enforcement action. RCRA, passed by Congress in 1976, regulated the safe and proper handling, storage, treatment and disposal of hazardous wastes. RCRA allowed states to assume responsibility for the administration and application of RCRA within state borders. The new law made it clear that federal sovereign immunity was not a bar to enforcement and civil penalty action by state and federal regulators. While there were some exceptions, the law strengthened the ability of the

▲ *Energy Assistant Secretary Leo Duffy.*

states and the U.S. Environmental Protection Agency to enforce compliance agreements.

Leo Duffy, Energy Assistant Secretary for Environmental Restoration and Waste Management, announced his resignation in August, effective at the end of the year.

DOE officials concluded they could not have a facility ready to store nuclear waste from the nation's commercial nuclear power plants by a 1998 deadline, and announced they would search military bases and nuclear weapons production sites for temporary storage sites.

"Our protective scheme is such that no one's ever going to get off of this site — and I'm saying 'ever' get off of this site — with special nuclear materials."

– Robert Rosselli, DOE Assistant Manager for Administration, commenting on an *Oregonian* story that cited a 1979 internal report acquired through the Freedom of Information Act that some sites at Hanford were vulnerable to sabotage, attack, and potential theft of plutonium. (*The Oregonian,* November 16, 1992).

1993

"What I fear is that this $20 billion has not even begun to scratch the surface of cleaning up this nation's atomic energy defense wastes. I fear that we are staring into a toxic abyss of unimagined depth and unknown characteristics."

– Oregon Senator Mark Hatfield on the U.S. Department of Energy cleanup program. (*Tri-City Herald,* July 30, 1993).

The Cleanup

The arrival of Bill Clinton's Administration brought major changes to the U.S. Department of Energy (DOE). Hazel O'Leary, an executive with Northern States Power Company of Minneapolis, became Energy Secretary. Tom Grumbly was selected to head up the DOE cleanup program. Before he was even confirmed by the Senate, Grumbly said one of his first priorities after he was confirmed would be to work with state and federal regulators to renegotiate cleanup agreements to make them more realistic. Secretary O'Leary also told Congressional members that she had doubts about DOE's ability to meet cleanup deadlines. She suggested some Tri-Party Agreement deadlines should be deleted and replaced with a new agreement without commitments.

DOE began to move forward with plans for major facilities to move the Hanford cleanup along. A number of cleanup plans were also finalized. DOE intended for Bechtel Group Inc. to lead much of that work as the company was awarded a five year, $800 million environmental restoration and management contract in January — taking that work over from Westinghouse. However, a protest of the contract prevented it from taking effect for more than a year.

A key to cleanup of Hanford's contaminated soil and contaminated buildings was a new engineered disposal site. DOE proposed to build a massive landfill to dispose of up to 30 million cubic yards of waste. The landfill would be ready for operations in mid-1996.

Groundbreaking ceremonies were held in June for a new $18 million liquid waste treatment plant. The plant would treat liquids from 300 Area facilities which had been discharging untreated liquids into the ground. The plant would be operational in early 1995.

In October, DOE announced plans for cleanup of the 1100 area and the former Nike missile headquarters at the base of Rattlesnake Mountain.

In November, DOE announced its final plan for disposal of eight former plutonium production reactors at Hanford. The reactors would remain where they were for 75 years to let radioactive materials decay. The reactor cores would then be moved away from the

Workers at one of Hanford's plutonium production reactors. ▼

Columbia River and buried on site. Earlier, DOE had indicated the reactors would be moved away from the river within 30 years.

Energy Assistant Secretary Grumbly gave approval for construction at Hanford of an $89 million Waste Receiving and Processing (WRAP) facility. WRAP would analyze, package and sort waste, much of which would eventually go to the Waste Isolation Pilot Plant in New Mexico. The facility would begin limited operations in early 1997.

DOE, the U.S. Environmental Protection Agency (EPA), and the Washington Department of Ecology reached agreement on a plan to pump liquids from tank T-101, declared a leaker in October 1992, to a double-shell tank. Leak detection systems at the tank would also be upgraded. By April, the pumping of 25,300 gallons of liquids from tank T-101 was completed. More than 100,000 gallons of sludge remained in the tank. Three million gallons of liquid waste remained to be pumped from 43 single-shell tanks.

While plans for various cleanup moved forward, there were a number of reminders of the multitude of hazards on the site.

In February, a possible leak was discovered in the K-East basin, where spent fuel from the N Reactor was stored. Measurements indicated the basin was losing about 50 gallons of water an hour. The basin leaked for several years in the 1970s and was repaired in 1980.

Later, Hanford officials detected a buildup of plutonium in a filtering system at the K-East basin. The plutonium was estimated at 775 to 1,800 grams, well in excess of the DOE limit of 225 grams. DOE officials said the plutonium was diluted and not likely to cause a criticality accident.

The Oregon Department of Energy asked DOE for information about what damage a serious earthquake could cause to Hanford's K-Basins and the potential that would result in a release of radioactive material to the environment.

All work at Hanford's Plutonium Finishing Plant (PFP) involving plutonium was halted in March after two contamination accidents within five days. PFP had the second largest plutonium inventory in the United States with an estimated four metric tons of plutonium in its vaults, and more than 13 metric tons of plutonium-bearing materials. These included scrap materials, liquids, metals and oxides.

An internal report from DOE's Office of Nuclear Safety said worker contamination incidents were common and that radioactive materials were frequently being released to the environment. DOE officials said the incidents raised in the report from Steven Blush, the Office's Director, were not as serious as the report indicated.

DOE and Westinghouse were fined $100,000 for violating hazardous waste regulations at the tank farms.

In June, Energy Assistant Secretary Grumbly came to Hanford to investigate an accident that fatally injured a Hanford worker. Lou Beatty received second and third degree burns from steam escaping from a valve. Energy Secretary O'Leary had previously announced that any worker death or serious injury would be investigated by a top Headquarters official. Beatty died a week later.

"There is no doubt DOE's contractors are not performing as they should. People are being injured and contaminated and hazardous materials are being spilled or released into the environment almost every day."

– Conclusions from DOE's Office of Nuclear Safety. (*Seattle Post-Intelligencer*, April 17, 1993).

"The accident rate is unacceptable to us. Unless we change the way we do things…we're going to have another death."

– Hanford Deputy Manager Phil Hamric. (*Tri-City Herald*, August 13, 1993).

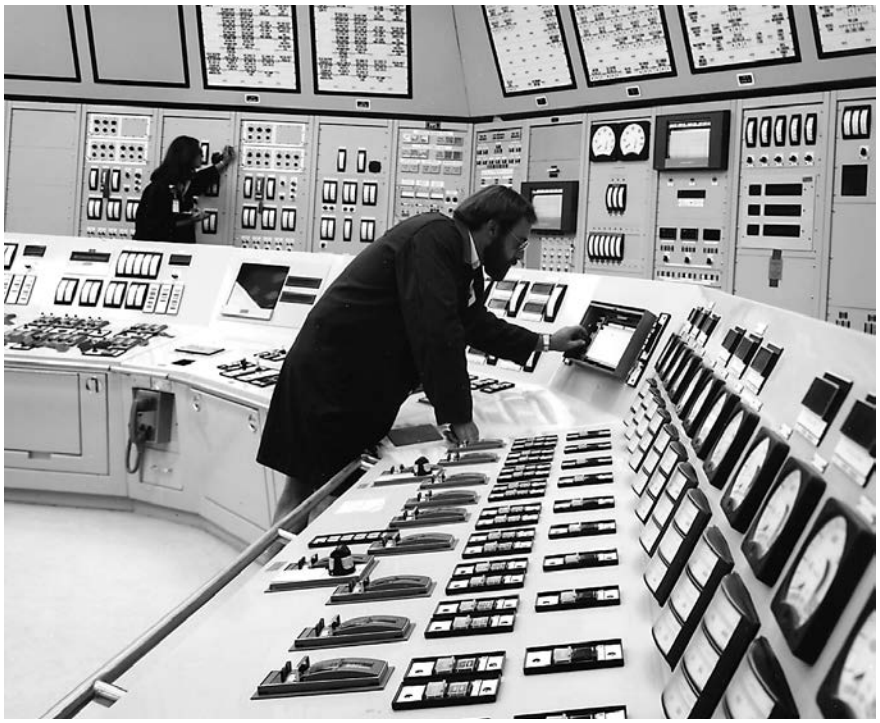
A General Accounting Office (GAO) report said aging and inactive DOE facilities posed a serious threat to workers' health and safety. The report said some facilities at Hanford did not receive routine maintenance and inspection as required by DOE regulations.

In August, a Hanford worker taped a rock to a rope and dropped it into a waste tank to see if a pipe was plugged. He was slightly contaminated. DOE officials shut down tank farm work except for monitoring and essential maintenance and ordered 350 workers to undergo remedial safety training. The incident followed 17 lost time accidents at the tank farms in the previous 12 months.

The Nuclear Regulatory Commission (NRC) denied a request by Oregon and Washington for the NRC to oversee the handling and disposal of millions of gallons of Hanford's radioactive and hazardous waste. The decision came three years after the states asked the NRC to change its rules and assume jurisdiction over the waste storage tanks.

In September, a two day "Hanford Summit" was held in the Tri-Cities. The summit focused on public involvement, regulations review, worker training and technology transfer. Energy Secretary O'Leary pledged to streamline Hanford's cleanup; to declassify large amounts of DOE documents within 30 days; to push to transfer Hanford's lands to public use as soon as possible; and to pay attention to employee's concerns about whistleblower issues. She also announced the end of a hiring freeze to help deal with tank safety issues; said she would meet with Tribal representatives within three months; would explore funding for public involvement activities and would work with the state to explore the creation of a Hanford advisory panel.

Shutdown of the Fast Flux Test Facility (FFTF) was delayed while yet another review was conducted of its potential use. By October,



◄ *FFTF control room.*

"One time out of 100 someone will cut corners to get the job done. We can't have that one in 100…Winging it is not the way we deal with a drain plug in a hazardous area."

– Kaiser President Dick French, commenting on a Hanford worker sticking a rock on a rope inside a high-level waste tank. (*Tri-City Herald,* August 13, 1993).

"That was one of the more stupid activities I've heard about on a (nuclear) reservation."

– Energy Assistant Secretary Tom Grumbly. (*Tri-City Herald*, August 14, 1993).

"This has been a helluva year, one which has anguished each and every one of us. We will correct that."

— Energy Secretary Hazel O'Leary at the Hanford Summit. (*Tri-City Herald,* September 16, 1993).

"There is no combination of compatible missions for the Fast Flux Test Facility that has reasonable probability of making the facility financially viable in the foreseeable future."

— Letter from Energy Secretary Hazel O'Leary to House Speaker Tom Foley of Washington. (October 7, 1993).

"Hanford will remain in the limelight and work there is likely to remain under a microscope to see how efficiently we use those dollars."

— John Lindsay, President of Tri-City Industrial Development Council. (*Tri-City Herald,* October 15, 1993).

that committee recommended to Energy Secretary O'Leary that the reactor be shut down. In December, Secretary O'Leary ordered the permanent shutdown of the FFTF.

A House-Senate Conference committee approved a spending bill that included $2 billion for Hanford, including $1.6 billion for cleanup.

A GAO report said DOE wasted hundreds of millions of dollars in the way it drilled monitoring wells at Hanford. The report said efforts should be taken to use more efficient drilling methods.

DOE said it would not pay Westinghouse Hanford a $2 million performance bonus the contractor had expected to receive. Westinghouse got the lowest rating in its seven years as Hanford's primary contractor, following numerous safety problems and the death of a worker.

A proposal was made to complete two unfinished Washington Public Power Supply System (WPPSS) nuclear reactors to destroy the nation's surplus plutonium and create electricity. The "Isaiah Project" would have completed WPPSS #1 at Hanford and WPPSS #3 at Satsop in Western Washington.

Tank Waste Treatment

Plans for Hanford's high-level waste vitrification project began to stall.

In January, DOE issued its newest five year cleanup plan, the final from the Bush Administration. It suggested it might be necessary to delay vitrification of Hanford's tank wastes. DOE officials the following month said they were considering several possible changes to the schedule to begin high-level waste vitrification at Hanford. One possible scenario would delay the process until 2020.

"Continued adherence to the current Tri-Party Agreement schedule may result not in timely completion of the program but in the construction of facilities that are not cost-effective or do not work…The desire to hold to deadlines needs to be balanced against the very real possibility that billions of dollars could be spent on a vitrification plant that simply cannot do the job."

— General Accounting Office Report, recommending a delay in construction of Hanford's high-level waste vitrification plant. (GAO/RCED-93-99, March 1993).

A GAO report in March endorsed delays in construction of the vitrification plant and renegotiation of the Tri-Party Agreement. The report said major technical problems existed in all parts of the tank waste cleanup program and unrealistic Tri-Party Agreement deadlines might result in DOE spending billions of dollars on a plant that could sit idle for years. The GAO recommended that construction be postponed until a final decision was made on how high-level waste would be immobilized and design was complete on the facility. Two days later, Energy Secretary O'Leary met with Washington Governor Mike Lowry and assured him DOE would uphold cleanup agreements.

"We need to take a very hard look…and determine whether we are in a position to truly deliver on all the commitments."

— Energy Secretary Hazel O'Leary to a House Committee hearing, talking about DOE's ability to meet cleanup deadlines. (*Tri-City Herald,* May 19, 1993).

Later that month, Ecology, DOE and EPA agreed to at least a six month delay in the start of construction on the vitrification plant and asked for public input to help guide the renegotiations.

In May, the Hanford Tank Waste Task Force met for the first time — convened by DOE, EPA and Ecology. The Task Force included representatives of Tribal, state and local governments, business, economic development, agriculture, environmental groups, interest groups, labor and public health. The group met four times from May through September. The Task Force expanded on and reinforced the principles relating to overall Hanford cleanup that were initially rec-

◀ *Grout vaults under construction — the grout program was abandoned as part of a Tri-Party Agreement renegotiation.*

ommended by the Future Site Uses Working Group. The Task Force also identified values specific to the tank waste treatment program. The process provided new opportunities for public input to influence Hanford decision-making and was the springboard for formation of the Hanford Advisory Board. The Tank Waste Task Force issued its final report in September. It concluded the need for cleanup was compelling and urgent and encouraged the Tri-Parties to "get on" with cleanup. The Task Force also recommended the Tri-Party Agreement be strengthened.

In October, the Tri-Parties completed renegotiation of the Tri-Party Agreement. The renegotiation allowed for a delay in constructing the vitrification plant, the addition of a vitrification plant for low-level waste, and extended overall cleanup by ten years. It set a new target date of 2028 to complete all vitrification of tank waste. The revisions also escalated actions to treat contaminated groundwater. DOE abandoned the grout program, despite costs so far of $200 million. Ecology, the Yakama Indian Nation and others had raised concerns about the effectiveness of grout for entombing low-level radioactive waste. The concerns included how well the grout would hold up over time and the amount of long-lived radioactive materials that would be in the grout. Early tests showed more heat generated within the grout than had been expected.

In December, a Massachusetts-based consortium proposed to DOE to construct a privately funded high-level waste vitrification plant at Hanford. The plant would be a replica of plants used in France. The consortium said it would spend more than $1 billion and DOE would pay only after waste was glassified. DOE officials said the proposal was worth considering.

" 'Get on with the cleanup' to achieve substantive progress in a timely manner. Get on with it reflects a sense of urgency and purpose and a desire to see the cleanup move forward productively as quickly as possible."

— From the Final Report of the Hanford Tank Waste Task Force, September 1993.

"We don't want to put over four million curies in a less-than ideal waste form in the ground at Hanford."

— Todd Martin, Hanford Education Action League, commenting on concerns about the use of grout to entomb tank waste at Hanford. (*Tri-City Herald,* February 1, 1993).

"It reflects a higher priority on dealing with urgent safety problems and will allow us to get the majority of the waste out of old, deteriorating tanks on a faster schedule."

— Energy Assistant Secretary Tom Grumbly, commenting on negotiated changes to the Tri-Party Agreement. (DOE News Release, October 1, 1993).

"We now believe the delay in the high-level waste treatment project is a reasonable trade for commitments that will prevent radioactive and chemical wastes from reaching the Columbia River in the future."

— Michael Grainey, Oregon Department of Energy. (Oregon Department of Energy News Release, October 4, 1993).

"The reason the report is old is that they worked so hard at making it old. Delay and deny, that's their game plan."

– Oregon Congressman Ron Wyden, commenting on a Department of Energy report from July 1992 that he made public and which Westinghouse officials said was outdated. The report found the condition of Hanford's tank farms was poor and continued to deteriorate further and that one third of the tank monitoring instruments did not work. (*New York Times,* February 29, 1993).

Tank Safety

Considerable attention continued on tank SY-101 and its periodic venting of hydrogen gas. A 64-foot tall, 19,000 pound circulation pump was installed in the tank in July — several months later than planned. The pump was designed to constantly mix the waste, releasing small amounts of hydrogen on a continuous basis rather than allowing a large buildup of hydrogen to occur. A series of tests were conducted on the mixer over the following weeks. In September, the tank vented 26 minutes after the mixer pump was started. The second test phase of the circulation pump began in October, when the pump was run at increased speeds for longer periods of time.

In April, a waste storage tank at the Tomsk-7 complex in Russia exploded and caused a fire. The tank contained a uranium solution. DOE officials said the contents of Hanford tanks were different and a similar incident was unlikely at Hanford.

Installing mixer pump in tank SY-101. ►

The Defense Nuclear Facilities Safety Board (DNFSB) urged DOE in July to expand and accelerate its tank waste characterization program at Hanford. The DNFSB concluded additional characterization was essential for ensuring safety in the near term and necessary for permanent treatment of the waste. The DNFSB recommended DOE complete safety-related sampling and analysis of all Watch List tanks within two years.

In July, Energy Assistant Secretary Grumbly testified before a Senate Committee on Hanford's tank problems. He said DOE would design a plan to resolve safety and health problems related to the tanks. In September, Grumbly announced details of the plan, which included additional training and recertification of tank farm operators. Grumbly also said installation of gas monitoring equipment in 23 tanks would be accelerated and leak detection systems in the tanks would be upgraded.

Around the DOE Complex

In May, Secretary O'Leary announced major new health and safety procedures for DOE. The new procedures allowed surprise safety audits at the sites and provided for a three to five year transition to the Occupational Safety and Health Administration for regulating health and safety issues.

Energy Assistant Secretary Grumbly predicted cleanup of the weapons complex could exceed one trillion dollars in cost. At a conference on environmental restoration and waste management in Kennewick, Grumbly said estimates of $50 billion for Hanford cleanup were not realistic. William Wiley, director of Battelle, said Hanford cleanup could top $250 billion.

A DOE report said tons of spent nuclear fuel were stored unsafely in storage pools at Hanford, the Savannah River Site and the Idaho National Engineering Laboratory. In addition, spent fuel buried in trenches at Hanford and at the Oak Ridge Site also posed hazards. The report concluded fuel storage facilities and three burial grounds warranted priority action. The sites at Hanford were the PUREX canyon, the K-East basin, and a burial ground in the 200 West area.

Hopes that scientific advancements in transmutation could drastically shorten and simplify the DOE cleanup appeared unlikely. A GAO report said technology to transmute (or change) radioactive waste into a less radioactive form was decades and billions of dollars away from practical application.

DOE announced it was looking at seven sites, including Hanford, for permanent storage of spent nuclear fuel from Navy vessels and DOE reactors. The action was the result of a federal court ruling that DOE examine alternatives to storing spent fuel at the Idaho National Engineering Laboratory.

"The Board has repeatedly expressed its dismay at the continued slow rate of conduct of this (tank waste) characterization program and has urged a greater rate of progress. At last count, only 22 of the 177 tanks on the site have been sampled. Only four of those sampled were among the 54 tanks on the watch list of tanks that generate the greatest safety concerns."

– Defense Nuclear Facilities Safety Board Recommendation 93-5. (July 19, 1993).

"The objective of these people may have been to protect the country, but they made some decisions at the expense of an unsuspecting public. The idea of releasing these amounts of radiation on people in an area in secret is a little hard to swallow."

– Ohio Senator John Glenn, referring to Cold War-era radiation tests on American citizens. (*New York Times,* December 16, 1993).

"The public record is very clear that the United States Government engaged in deliberate acts of deception against the American public in the 1940s and 1950s in order to prosecute the nuclear arms race."

– Bob Alvarez, Senior Aide to Energy Secretary Hazel O'Leary. (*New York Times*, December 16, 1993).

In December, Energy Secretary O'Leary revealed that during the Cold War the government conducted more than 800 radiation tests on 600 people. O'Leary said she was "appalled, shocked and deeply saddened" to learn 18 people were injected with plutonium without their knowledge. O'Leary also said the U.S. Government conducted 204 unannounced underground nuclear tests between 1963 and 1990, several of which resulted in radioactive material released to the environment. O'Leary also released information on the nation's plutonium stockpile. Hanford had over 12 tons of plutonium on site — most of it reactor-grade fuel, but also about 441 pounds of weapons-grade plutonium. Hanford produced about 60 percent of the nation's plutonium.

Battelle Pacific Northwest laboratory soon after released a summary of secret radiation experiments conducted by Hanford and Hanford-funded scientists during the Cold War. Tests included the injection of five people with phosphorus 32, irradiation of inmate sex organs at both the Washington and Oregon State Penitentiaries, and exposure of 15 people to tritium.

"To put it bluntly, we need to get the tanks out at Hanford under control… The frightening thing is nothing has been cleaned up. There is paper pushing, there are clouds of dust out there, but nothing is being accomplished. We don't intend to shove billions of dollars into this without results."

– Senator Bennett Johnston of Louisiana. (*Tri-City Herald*, July 30, 1993).

1994

"We inherited a mindset that said, 'Folks, whatever this costs, it's in the national interest and we do it.' You do it behind closed doors and you just do it. That mindset carried over into the earlier days of cleanup."

– Sid Morrison, former Congressman for southeastern Washington. (*Spokesman Review,* November 14, 1994).

The Cleanup

A continuation of increased citizen involvement in the Hanford cleanup occurred with the first meeting of the Hanford Advisory Board (HAB). HAB members spent much of the first meeting discussing how they would function and what issues they should tackle. The HAB was formed based on stakeholders' and the U.S. Department of Energy's (DOE) experience with two previous advisory groups — the Tank Waste Task Force and the Future Site Uses Working Group. HAB membership was broadly representative of the diverse interests affected by Hanford cleanup issues. Members included Native American tribes, local governments, the State of Oregon, workers, environmental groups, public health, local business, and other public interest groups. The HAB met under authority of the Federal Advisory Committee Act. Its primary mission was to provide informed recommendations and advice to DOE, the U.S. Environmental Protection Agency (EPA) and Washington Department of Ecology on major policy issues related to the cleanup of Hanford.

◄ *The first meeting of the Hanford Advisory Board.*

"We have an enormous agenda over the next few years of what you could grapple with. Whatever you pick, stick with it."

– Energy Assistant Secretary Tom Grumbly to members of the newly-formed Hanford Advisory Board. (*Tri-City Herald*, January 26, 1994).

"I've been skeptical of these committees working twice in the past. And I've been wrong twice. I'm prepared to be proven wrong again."

– Dan Silver, Washington Department of Ecology, on hopes for the Hanford Advisory Board. (*Tri-City Herald*, January 26, 1994).

In February, DOE again awarded Bechtel Hanford Company an $800 million, five year environmental restoration and management contract. An earlier award of the contract resulted in a challenge by the losing bidders. Bechtel took over environmental restoration duties from Westinghouse in July.

Groundbreaking ceremonies were held in April for Hanford's Waste Receiving and Packaging (WRAP) facility and for Hanford's $228 million Environmental and Molecular Sciences Laboratory. WRAP would be used to package transuranic waste for shipment to the Waste Isolation Pilot Plant in New Mexico. The laboratory would be used to help develop new methods for cleanup.

Work also began on a prototype earthen barricade, the "Hanford Protective Barrier." The barrier was intended to isolate waste areas and would use layers of rock, soil, gravel, sand and asphalt to form a barrier to help control how moisture migrated through the soil.

Hanford officials said a major earthquake could cause a catastrophic accident at the K-Basins. An earthquake could cause a construction seam to fail, resulting in water leaking from the basins and exposing the spent nuclear fuel stored there. The fuel could then spontaneously catch fire, releasing a plume of radioactive materials into the environment. The Defense Nuclear Facilities Safety Board said there was an urgent need for DOE to treat and stabilize spent nuclear fuel and plutonium-bearing materials at Hanford and other DOE sites. By October, Westinghouse recommended to DOE that instead of restarting the PUREX facility to process the fuel, K-Basin fuel instead be packed in water-filled canisters, moved to some other location on site, then chemically dried and processed so it could be stored safely in a dry environment. Westinghouse predicted the spent fuel rods and sludge could be removed from the basins by 2000.

The independent scientific panel directing a study into past radioactive material releases from Hanford announced new findings in April. Among the major results: radioactive iodine 131 released to the air from Hanford in the 1940s and 1950s traveled over a larger area of the Pacific Northwest than scientists previously assumed. The wider dispersion resulted in generally lower radiation doses to people near Hanford than previous estimates made in 1990. At some more distant locations, estimated doses were up to ten times higher than previously announced, although these doses were still far lower than doses near the site.

DOE began in May to ship 309 capsules of cesium 137 from an irradiation facility in Colorado back to Hanford for storage. Western states worked with DOE to develop a transportation safety plan for the shipments. The transportation plan would later be used on shipments of transuranic waste from Hanford to the Waste Isolation Pilot Plant.

Hanford Summit II was conducted in Pasco in June. The Summit focused on compliance with federal and state standards and on economic development opportunities in the Hanford cleanup. Energy Secretary Hazel O'Leary said she would support an aggressive eco-

"As we begin this Hanford Summit, there is a great deal of excitement and anticipation about the economic potential of this cleanup operation. It means large dollar infusions and significant job creation for this area of the Northwest…But we must not lose sight of the fact that our highest priority for Hanford must go to making this environmental danger zone safe and clean for our citizens and our future."

– Oregon Governor Barbara Roberts, in remarks at Hanford Summit II. (June 16, 1994).

nomic development plan for the region to help the transition from Hanford and federal funding. She also said DOE had not made as much progress as she had hoped when she made several promises at the first Hanford summit nine months previous.

By August, several new laboratory hot cells were completed at Hanford, doubling the space to examine Hanford wastes. The hot cell expansion began in 1992.

EPA and Ecology issued a hazardous waste cleanup permit to DOE in September that covered all cleanup at five non-radioactive work sites. Additional permits were expected to eventually include another 55 waste sites. Ecology and EPA officials said the permit established clear regulatory authority over DOE cleanup efforts at these sites.

DOE said designs of six new double-shell underground waste storage tanks were nearly complete and construction should begin within a few months.

In September, Hanford officials marked the 50 year anniversary of B Reactor going critical.

Changes in the Tri-Party Agreement were agreed to in October by DOE, EPA and Ecology, which would shift the environmental management program's top priority to cleanup along the Columbia River shoreline. This was a significant change and would guide major cleanup decisions and priorities through at least the next 15 years.

Representatives from four Indian nations asked DOE to involve them early in cleanup planning so they could help ensure sacred tribal sites were not disturbed. Tribal members said several sacred sites had already been disturbed at Hanford. The construction site for the Environmental and Molecular Sciences Laboratory was moved earlier in the year after human remains were found.

DOE announced in September that the Fitzner-Eberhardt Arid Lands Ecology (ALE) Reserve and the North Slope area of the Columbia River were completely cleaned up. The two areas contained 260 square

"The significance of it is that for the first time, Hanford has a (Resource Conservation and Recovery Act) permit issued, and it will form the foundation for future permitting at the site."

– Dan Duncan, U.S. Environmental Protection Agency. (*Tri-City Herald*, September 1, 1994).

The Fitzner-Eberhardt Arid Lands Ecology Reserve ▼

"My personal preference is that rather than turning it over to another government agency, we should turn it over to real, live people."

– Energy Secretary Hazel O'Leary, who said she would favor the Yakama Indian Nation to manage the Arid Lands Ecology Reserve. (*Tri-City Herald,* December 22, 1994).

"The way the laws currently work, the states and regulatory agencies really have all the power, and the DOE really has no power."

– Assistant Energy Secretary Tom Grumbly, on DOE plans to ask Congress to scrap dozens of existing cleanup agreements with the states to try to save billions of dollars. (*New York Times,* December 21, 1994).

"To abandon the provisions of (recent amendments to the Tri-Party Agreement) in the name of budget reductions self-imposed by the Administration will destroy USDOE's credibility with the people of the Pacific Northwest to whom the successful cleanup of Hanford is of critical importance."

– Letter from Michael Grainey, Assistant Director, Oregon Department of Energy, to Energy Assistant Secretary Tom Grumbly. (December 29, 1994).

miles of land and represented 40 percent of the Hanford Site. There were 32 waste sites on the ALE and 39 on the North Slope. They included small motor pools and missile and anti-aircraft sites. Cleanup costs totaled $6.8 million.

Energy Secretary O'Leary said she favored allowing the Yakama Indian Nation to manage the ALE Reserve. DOE was examining whether to have the Yakama Nation or the Bureau of Land Management manage the area.

DOE announced the Nature Conservancy of Washington had discovered four new species at Hanford in the past year. The discoveries included three insects belonging to the leafhopper group and one new plant species.

Budget woes become evident by September. Hanford officials said the fiscal year 1995 budget was $63 million short of money needed to meet the cleanup schedule for environmental restoration work. The announcement came at a news conference to announce a shift at Hanford from investigation and analysis to cleanup. DOE officials later said they were preparing to cut Hanford's fiscal year 1995 budget by $194 million to offset shortages at other sites. Westinghouse and other contractors offered early retirement to 1,291 employees in an effort to reduce the Hanford workforce by 1,000 by the end of the calendar year. By December, Hanford contractors announced they expected to lay off 500-1,000 workers early in 1995.

The Spokesman Review newspaper printed an in-depth report on spending at Hanford and concluded that billions of dollars had been wasted. The report referred to Hanford funding as a "river of public money" which "waters the south-central Washington economy." The report said Energy Assistant Secretary Tom Grumbly suspected one in three dollars was wasted and that after five years and $7.5 billion, "Not a single major radioactive mess has been cleaned."

DOE acknowledged that it would ask Congress in 1995 to amend the Superfund statute and other cleanup laws to allow it to focus on cleanup of the riskiest sites and hopefully save billions of dollars. Energy Secretary O'Leary said the DOE cleanup program was not focused on the biggest risks and that existing cleanup agreements with the states were a problem.

Secretary O'Leary, in a letter to Congress, said DOE would no longer pay to maintain mothballed commercial nuclear reactors at Hanford or Satsop in Western Washington. The action ended any chance of finishing the reactors and using them to destroy surplus plutonium (the "Isaiah Project").

International Atomic Energy Agency representatives conducted their first inspection of surplus plutonium at Hanford. The plutonium was placed under international control.

Tank Waste Treatment

In August, DOE officials said that an unsolicited private bid to vitrify Hanford's tank wastes was not acceptable. However, DOE did announce it was seeking bids from corporations interested in managing, processing and disposing of Hanford's tank waste. Westinghouse officials, who conducted these activities, said they were surprised at the announcement. DOE officials said they were simply trying to determine what level of interest there might be. At a technical briefing for interested companies held the following month, DOE officials said they wouldn't completely rule out using Hanford treatment facilities for treatment of wastes from other sites. Energy Assistant Secretary Grumbly said the plants would be dedicated primarily for waste from Hanford.

Tank Safety

One Hanford tank safety issue was put to rest while new concerns were raised. In April, a DOE study concluded that an uncontrolled nuclear reaction, or a "criticality" could not occur in Hanford's tanks. The issue was raised in April 1992.

Ten tanks were added to the Watch List in May because of concerns about the presence of organics, which could ignite under certain conditions. Five of the ten tanks were already on the Watch List because of other concerns. Safety controls were ordered for two of the tanks, BY-107 and BY-108, after vapor samples showed higher than expected concentrations of organics. Additional sampling and analysis would be done at the tanks.

In July, there was concern that temperatures were rising in tank C-106. Westinghouse began to add water to the tank to control the temperature rise. Westinghouse had stopped adding water to the tank in March to try and reduce the risk of a leak. Restrictive work status was instituted at the tank. By August, DOE concluded C-106 was not heating up and was operating safely.

The mixer pump in tank SY-101 was working routinely by April. Final tests were completed on a second mixer pump in late summer. The pump was a backup to the one being used in the tank. Hanford workers installed two new video cameras in tank SY-101 in November. Several more Hanford tanks were scheduled for similar monitoring systems.

By December, work was underway at Hanford to move liquid waste out of eight single-shell tanks, the most at one time since the early 1980s.

The General Accounting Office (GAO) reported in December that the backlog on maintenance of Hanford's tank farms was about 1,500 projects — including 19 malfunctioning leak detectors. Despite huge investments of time and money, DOE had not been able to

"The department is saying, 'Here are the opportunities we have at Hanford, here are the problems we are facing. Are you interested?'"

– Hanford Manager John Wagoner, announcing that DOE was seeking bids from corporations interested in managing, processing and disposing of Hanford's tank waste. (*Tri-City Herald,* August 25, 1994).

"If an airline had this sort of miserable service record, you can bet that airline would be grounded."

– Ohio Senator John Glenn, on the maintenance backlog in Hanford's tank farms. (*New York Times*, December 19, 1994).

▲ *Energy Secretary Hazel O'Leary*

dramatically lower the backlog. Westinghouse managers said that in order for work to be done in a relatively timely manner, the maintenance backlog should not exceed 300 projects.

Around the DOE Complex

Energy Assistant Secretary Grumbly said DOE could not follow budget recommendations from the Congressional Budget Office to cut cleanup funding 10 percent annually through 1999. He said further cuts would prevent DOE from resolving urgent risk issues and meeting cleanup agreements.

In June, Energy Secretary O'Leary revealed additional details about more Cold War human radiation experiments. More than 1,000 people had been involved in the 48 experiments.

A DOE report said Hanford's Plutonium Finishing Plant was DOE's fifth most hazardous problem related to plutonium storage. The report looked at plutonium storage at 35 facilities in 12 states. Rocky Flats in Colorado was rated the number one risk to workers and the public, with Savannah River Site second.

A GAO report said little cleanup had been accomplished by DOE in the past five years, despite expenditures of $23 billion. The report said DOE was resistant to new technologies.

President Clinton proposed more than $4 billion in cuts in nuclear waste cleanup funding during the next five years and both the Clinton Administration and incoming House Speaker Newt Gingrich suggested that perhaps DOE should be eliminated. Energy Secretary O'Leary said DOE was working on plans for a major reorganization of the agency.

"If putting a man on the moon had been opened up to a stakeholder process that included EPA, the state Department of Ecology, the downwinders, the upwinders, the press, the Native Americans…would we ever have got a man on the moon in that time frame."

– Adrian Roberts, Battelle Vice President, voicing frustrations of trying to move forward with new cleanup technologies. (*Spokesman Review,* November 13, 1994).

1995

"We have given him an impossible job. We have ordered him to meet standards he cannot attain, to use technologies that do not exist, to meet deadlines he cannot achieve, to employ workers he does not need, and to do it all with less money than that for which he has asked. If he fails, we have threatened to put him in jail."

– Louisiana Senator J. Bennett Johnston, speaking about the challenge of cleanup faced by Energy Assistant Secretary Tom Grumbly. (Minutes of the Committee on Energy and Natural Resources, March 22, 1995).

The Cleanup

The Tri-Party Agreement and Hanford funding came under sharp criticism and threats that the Agreement should be pre-empted by Congress.

In January, the U.S Department of Energy (DOE) proposed a $1.29 billion Hanford budget for fiscal year 1996, which it was feared could result in an additional 2,700 job cuts beyond the 2,500 already expected by the end of the calendar year. Energy Assistant Secretary Tom Grumbly visited Hanford in February to explain the impact of the budget cuts. He said Hanford's workforce should stabilize in fiscal year 1997 at between 12,000 and 13,000 workers (it was 17,312 at the end of December 1994). In April, Westinghouse Hanford Co. issued 500 layoff notices. By year's end, the Hanford workforce stood at about 13,200. Hanford's fiscal year 1996 budget ended up at about $1.35 million for cleanup activities — less than DOE said was needed, but not as significant a cut as initially feared.

In March, a report to the Senate Committee on Energy and Natural Resources said Congress must act decisively to salvage the Hanford cleanup program and prevent further waste of taxpayer money. "Train Wreck Along the River of Money, an Evaluation of the Hanford Cleanup," concluded that Hanford management could not achieve a cleanup that was cost-effective and protective of human health and the environment without major changes. The report, also called the 'Blush Report' after one of its authors, said the Tri-Party Agreement hindered cleanup and "Hanford is floundering in a legal and regulatory morass."

"The proposal for some sort of "risk-based" centralized priority system…is unnecessary and unworkable. It is unnecessary because the agreements negotiated under the existing system already consider risk as a major factor in setting priorities."

– Letter from 23 Attorneys General, including Christine Gregoire of Washington and Ted Kulongoski of Oregon, to Energy Secretary Hazel O'Leary. (January 17, 1995).

"Congress will be able to fund the TPA only if it is willing to forgo appropriating money for other needs that almost certainly have a higher national priority. This would be true even if all of the money Congress sent to Hanford were spent wisely and judiciously, which, as this report makes clear, is not the case."

– From the Executive Summary of "Train Wreck Along the River of Money." (March 1995).

"Many of the schedules in the TPA are unworkable, disjunctive, lack scientific and technical merit, undermine any sense of accountability for taxpayer dollars, and most importantly, are having an overall negative effect on worker and public health and safety…significant cuts in the Hanford budget are necessary in order to regain control of the program…"

– From the Executive Summary of "Train Wreck Along the River of Money." (March 1995).

"The report downplays the substantial cleanup progress that has been made at Hanford… It suggests simplistic solutions to problems that…are extraordinarily complex."

– Energy Secretary Hazel O'Leary, in response to the "Blush Report." (DOE News Release, March 14, 1995).

"Anytime you talk about breaking a tripartite agreement negotiated in good faith by sincere people all trying to do the right thing…it sends people up the wall. But it simply must be done. We cannot get there from here."

– Louisiana Senator J. Bennett Johnston. (Minutes of the Committee on Energy and Natural Resources, March 22, 1995).

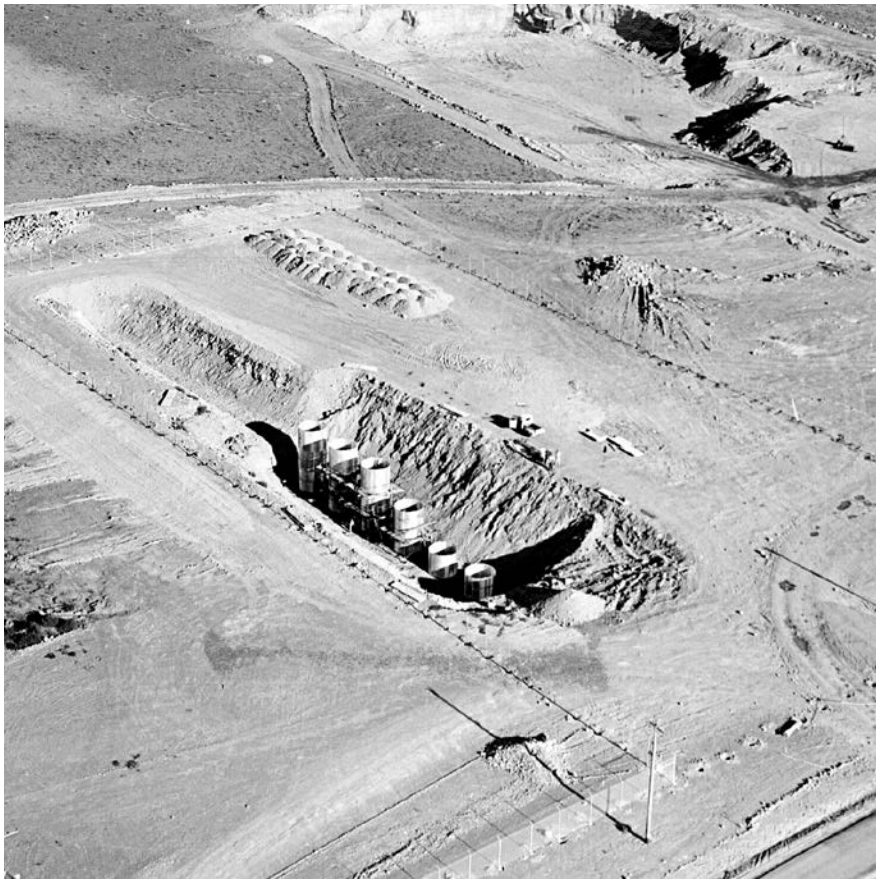
"I categorically reject the notion the overall cleanup is fatally flawed and that we should scrap the entire effort."

– Letter from Washington Attorney General Christine Gregoire to Alaska Senator Frank Murkowski. (March 21, 1995).

The report sparked Congressional hearings in which the ranking members of the Senate Energy Committee suggested that the Tri-Party Agreement was impossible to carry out and that Congress should rewrite the laws concerning such projects. They said the program to clean up Hanford could not achieve its goals under any conceivable budget or timetable and should be scrapped. State of Washington officials, including Washington Senators Patty Murray and Slade Gorton, defended the Tri-Party Agreement and said the DOE management problems were more of a factor in the lack of cleanup progress.

The Blush report recommended that Congress set a specific limit on how much money would be spent at Hanford every five years. Senator J. Bennett Johnston of Louisiana, who initially opposed a spending cap, prepared legislation to cap Hanford's budget at $800 million annually, roughly half of current levels. At the last minute, he did not introduce the bill.

In May, Washington Attorney General Christine Gregoire and attorneys general from more than a dozen other states met to discuss drafting proposed legislation to protect the Tri-Party Agreement and similar agreements. The attorneys general said they were looking for ways to speed cleanup, but not at the loss of the states' rights to oversee the work.



Construction of a burial ground near the K-East reactor in 1954. ►

Senators Frank Murkowski and Johnston introduced a bill in May that would pre-empt the Tri-Party Agreement and certain federal laws in Hanford cleanup. The bill did not cap cleanup funding.

Senator Murkowski said he would also propose an amendment to the Nuclear Waste Policy Act to allow storage of commercial spent fuel at Hanford and the Savannah River Site.

The Hanford Advisory Board (HAB) weighed in on the budget issue. The Board released a news release in January which challenged DOE to honor environmental laws and Hanford cleanup agreements. The HAB said DOE budget announcements anticipating major cutbacks in the cleanup budget showed a "disturbing disregard" for DOE's legal commitments. At its February meeting, the HAB elected Merilyn Reeves as Chair. She had been acting Chair since December and represented the Oregon League of Women Voters on the HAB. The HAB also adopted an 11-point advisory that said the Washington Department of Ecology and the U.S. Environmental Protection Agency (EPA) should impose strict controls on mixed waste transfers from other DOE sites to Hanford. Among the points: Hanford must have storage capacity, processing ability and funding to handle any new waste; new waste must comply with Washington State's Dangerous Waste law and the terms of permits and other consent orders and agreements; and Ecology and EPA should not permit long-term storage of other DOE sites' mixed wastes at Hanford.

DOE completed the 300 Area Treated Effluent Disposal Facility ahead of schedule. The facility would treat waste water from nearby laboratories and other buildings in the area and was part of the strategy to end discharge of untreated waste water anywhere on site. Ecology also issued DOE a permit for a Hanford liquid waste disposal facility located in the 200 area. It was the first permit issued by the state to Hanford to control a major liquid waste discharge.

By June, DOE and its contractors met a major Tri-Party Agreement milestone related to stopping liquid waste discharges into the ground. The 33 worst liquid waste streams at Hanford had all been stopped, treated, or re-routed away from hazardous waste disposal sites.

Work was suspended on an underground barrier at the N Springs. The soil was so dense the barrier could not be installed as designed. The barrier was intended to slow the movement of groundwater to the Columbia River until strontium 90 in the groundwater could be pumped and treated. Bechtel later recommended against installing the underground barrier. Bechtel officials said the flow of strontium 90 to the river was only one fifth the previous estimates. Bechtel also said contaminants would likely seep beneath the barrier. Regulators reviewed Bechtel's data before ultimately supporting their position and the barrier was eventually scrapped.

"Maintaining independent state oversight is absolutely essential to a credible cleanup effort. Threats to the public and the environment at federal facilities are due in large part to decades of self-regulation."

– Letter to President Bill Clinton from 11 Governors and 37 Attorneys General, including Washington Governor Mike Lowry and Attorney General Christine Gregoire and Oregon Governor John Kitzhaber and Attorney General Ted Kulongoski. (July 12, 1995).

"It is an arrogant, naive and dangerous policy for the people of Washington."

– Washington Attorney General Christine Gregoire regarding a Congressional effort to pre-empt the Tri-Party Agreement. (*Tri-City Herald*, June 3, 1995).

"I believe Hanford and Savannah River offer excellent sites for the temporary, dry-cask storage of civilian nuclear fuel until a permanent geologic repository is available."

– Alaska Senator Frank Murkowski. (*Tri-City Herald*, May 27, 1995).

"The bottom line is that imported waste must not make Hanford cleanup problems worse."

– Merilyn Reeves, Hanford Advisory Board Chair, summarizing the Board's advice on receiving waste from other DOE sites. (HAB News Release, February 3, 1995).

"From today forward, the problem gets better. We're not making the groundwater contamination worse. This is one of Hanford's greatest cleanup successes since 1989."

– Doug Sherwood, U.S. Environmental Protection Agency. (*Tri-City Herald*, June 30, 1995).

▲ *A nitric acid shipment ready to depart for Great Britain*

Energy Secretary Hazel O'Leary endorsed 26 initiatives related to Hanford cleanup. The initiatives were intended to speed up cleanup, declassify more documents, and increase stakeholder participation in Hanford decision-making.

The Tri-Parties reached agreement on schedules for cleanup and deactivation of four major Hanford facilities — PUREX, the Uranium Trioxide Plant, the Fast Flux Test Facility (FFTF) and parts of the Plutonium Finishing Plant. Meanwhile, deactivation of the Uranium Trioxide Plant was completed four months ahead of schedule. The facility formerly converted liquid uranium to a powder form.

In March, Westinghouse officials announced they had cleaned up more than three million square feet of surface radiation contamination during the past year.

In May, Hanford began shipping 183,000 gallons of slightly contaminated nitric acid to Great Britain as part of the cleanup of PUREX.

Workers completed the installation of steel barriers in the K-Basins in April. Spent fuel stored in the basins was therefore isolated from areas of the basins most vulnerable to earthquake damage. In July, DOE said it was looking to accelerate K-Basin cleanup to December 1999. DOE officials hoped to finalize a plan for fuel removal by December 1995. To meet a 1999 date for removal of all the fuel, fuel removal would need to begin by November 1997. By October, DOE and its contractors admitted plans to accelerate spent fuel removal from the K-Basins had been too ambitious. A draft Environmental Impact Statement had been delayed which impacted the accelerated schedule.

A groundbreaking ceremony was held in July for the HAMMER training facility. The facility was designed to provide training and education programs to enhance the skills, knowledge and abilities of Hanford workers and emergency responders.

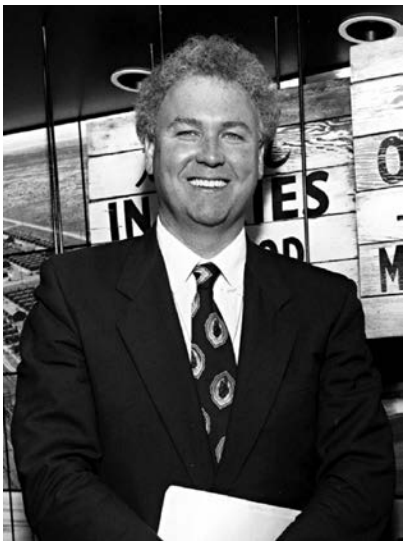
In August, more than 430,000 gallons of high-level radioactive waste was moved from a double-shell tank in the 200 West Area to a double-shell tank in the 200 East Area. It was the first time waste

had moved through the transfer line in six years, and freed up much-needed double-shell tank space in the 200 West Area to allow pumping of liquids from older, single-shell tanks.

The Oregon Department of Energy conducted an extensive statewide public involvement effort to gather input on DOE's Programmatic Environmental Impact Statement on the storage and disposition of surplus plutonium. Oregon also asked for public opinion on what role, if any, Hanford should play in these activities. More than 800 Oregonians in 18 cities participated in the process. The League of Women Voters of Washington, the Washington Physicians for Social Responsibility and 10 other organizations meanwhile conducted the "Plutonium Roundtable," a public forum to begin discussions on policy choices related to the transport, storage and disposal of surplus plutonium.

Defueling of FFTF was completed four and a half months ahead of schedule, although that did not prevent new efforts to try and save the reactor. Energy Secretary Hazel O'Leary agreed to a delay in draining the reactor's sodium coolant, a step which many believed would shut the reactor down for good.

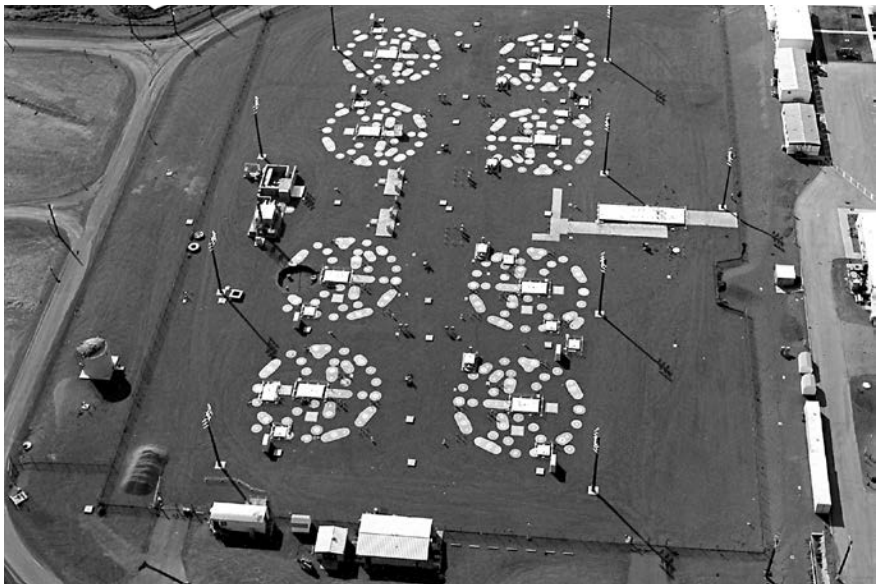
DOE awarded a $24 million 15 year contract to Allied Technology Group (ATG) to treat Hanford's low-level mixed waste. ATG would receive no payments until facilities were built and operating and waste was treated. That was expected to take about five years.



▲ *Energy Assistant Secretary Thomas Grumbly.*

Tank Waste Treatment

Energy Secretary O'Leary announced a major change for Hanford's vitrification program — DOE would pursue privatization in the hopes of lowering costs. Under the plan, DOE would offer a fixed price contract and would only pay for treated waste that met DOE



◄ *Aerial view of a Hanford tank farm.*

"The entire premise of privatization is the competitive dimension…We want to make sure that it's head-to-head competition throughout."

– Jackson Kinzer, DOE, on plans to proceed with privatization for treating Hanford's tank waste. (*Tri-City Herald,* September 30, 1995).

"This project will take the burden off the taxpayer's backs and provides tremendous business opportunities to environmental and engineering firms."

– Energy Assistant Secretary Tom Grumbly on DOE's draft request for proposal to privatize treatment of Hanford's tank waste. (DOE News Release, November 20, 1995).

"Issues of particular concern include: lack of substantial evaluation of promising privatization alternatives; continued focus on two pilot plants developed concurrently…the fact that DOE at this point is reserving its right to unilaterally determine whether and/or when the privatization initiative has failed and it is time to fall back to a management and operations contractual arrangement to deal with the high-level wastes in Hanford's tanks."

– From Hanford Advisory Board Advice #32. (October 1995).

"A modern, safe and reliable cross-site waste transfer capability is needed to expedite cleanup and minimize the risk associated with management of the tank waste. This is especially true in the 200 West Area where there is far less useable double-shell tank capacity than there is waste in single-shell tanks."

– Final EIS on Safe Interim Storage of Hanford Tank Wastes. (October 1995).

"It's larger than the amount spent on the Apollo space program. It's comparable to what it cost to build the weapons complex."

– Energy Assistant Secretary Tom Grumbly on DOE estimates to clean up the DOE nuclear weapons complex. (*Tri-City Herald*, April 4, 1995).

specifications. At least 14 companies initially expressed an interest. A draft request for proposal was issued in November. DOE estimated it would eventually cost $40 billion to treat all the tank waste. The HAB was one of several entities that expressed concerns about whether privatizing the project would be successful.

Westinghouse placed contracts with seven companies to test a variety of technologies for vitrifying low-level waste.

Hanford Manager John Wagoner said waste volume in the tanks had been reduced from 61 million gallons to 56 million gallons through use of the site's evaporator. Wagoner said Hanford may not now need two of the six new double-shell tanks currently planned. In May, a consultant hired by the HAB concluded DOE did not need any new double-shell tanks. DOE had been planning since late 1994 to construct six new tanks at a cost of $435 million, but also determined they were not needed.

Tank Safety

DOE studied whether to add 22 tanks to the Watch List. The tanks would be added because of concerns about flammable gasses. As a safety precaution, DOE ordered tank farm workers to follow the same work procedures required for Watch List tanks for all Hanford tanks until each had been reviewed.

DOE released a final Environmental Impact Statement (EIS) on safe interim storage of Hanford tank wastes. The preferred alternative included construction and operation of a replacement cross-site transfer system; continued operation of the tank mixer pump in SY-101; and transfer of liquids from single-shell tanks in the 200 West Area to double-shell tanks in the 200 East Area. This was to maintain safe storage until decisions could be made and implemented from an upcoming EIS.

Around the DOE Complex

In April, DOE estimated Hanford cleanup would cost $48.7 billion over the next 75 years. "Estimating the Cold War Mortgage" said cleanup at all 132 defense production sites would cost $230 billion. The study was the first analytical review based on estimates provided by each site. Cleanup costs at the Savannah River Site were estimated to be about the same as at Hanford. Each site was estimated at roughly 21 percent of the total cost.

A DOE report said DOE ignored technology developed by national laboratories that could speed cleanup and cut costs. It suggested one national lab be designated as the lead in coordinating cleanup research and technology development. The report said many sites had simply stopped looking for new, innovative solutions and were only

interested in avoiding risk.

Energy Assistant Secretary Grumbly told Congress in March that further cuts in DOE's cleanup budget would likely lead to lawsuits, which could then result in federal courts directing cleanup activities. He said further cutbacks would also endanger workers and hurt DOE's relationship with states and stakeholders.

DOE announced in April that it was preparing a Programmatic EIS on the disposition of surplus plutonium. Hanford was one of the sites to be studied for long term storage and also for methods of either "burning" the plutonium in a reactor or immobilizing it with other waste.

In May, Energy Secretary O'Leary announced a major reorganization of DOE. The number of employees would be cut by 27 percent — a large percentage from Headquarters — and 12 small field offices would be closed. By August, O'Leary said DOE would cut 3,788 jobs over five years to save $1.7 billion.

A study by a private group estimated the United States had spent $3.9 trillion on its nuclear weapons program. That is the total estimated cost associated with research and development, weapons delivery systems, security, communications and control systems, dismantlement costs and environmental cleanup.

In August, President Clinton proposed a permanent ban on nuclear weapons tests.

◄ *Many areas of the Hanford Site are marked by warning signs.*

"The cost of dealing with these problems can be considered a 'Cold War Mortgage.' Much of these costs were deferred during the nuclear arms race. Paying the mortgage will take decades and substantial resources."

– From the Executive Summary of 'Estimating the Cold War Mortgage.' (March 1995).

"It has a name: 'the Hanford syndrome.' It has become widespread and severe in the (DOE cleanup) program. Its symptoms are an unwillingness to alter familiar behavior patterns, to stick with unproductive or failing procedures… and to oppose innovation."

– From a DOE report on technology development. (*Tri-City Herald*, February 2, 1995).

"It would put me wildly out of compliance with the agreements. The states would sue us and they would win, according to my lawyers. And we could have things run by the courts. That would be the absolute worst outcome."

– Energy Assistant Secretary Tom Grumbly, to Congress in response to a suggestion of a further $1 billion cut in DOE's cleanup budget. (*Tri-City Herald*, March 9, 1995).

DOE issued its final report on radiation testing. Nearly 16,000 men, women and children were subjected to radiation experiments during the Cold War.

Idaho reached agreement with the Navy and DOE in October over radioactive waste storage at the Idaho National Engineering and Environmental Laboratory. In return for allowing the Navy and DOE to ship spent fuel to Idaho for storage, the federal government agreed to schedules to begin moving waste out of Idaho, with all spent nuclear fuel and transuranic waste removed by 2035.

"The Tri-Party Agreement must not be scrapped. The TPA was inspired by the threat of litigation on several fronts, and it offers a way to work through the legal challenges facing this very toxic hazardous waste site… People in our region deserve a voice in their future. The TPA is their voice."

– Washington Senator Patty Murray.
(Minutes of the Committee on Energy and Natural Resources. March 22, 1995).

1996

"We have been assured for many years that contaminants from the tanks were trapped in the soils beneath the tanks and were not traveling downward to the groundwater. This new information concerns us…(The) long-term risk has escalated. The data shows that time is not on our side."

– Washington Department of Ecology Director Mary Riveland, about cesium being detected much deeper than previously thought. (*Tri-City Herald*, February 21, 1996).

The Cleanup

The U.S. Department of Energy (DOE) confirmed what many had suspected for some time — contamination in Hanford's soils was much deeper than previously known. In February, new tests detected cesium from Hanford tanks in dry wells 125 feet below the surface, 85 feet above groundwater. Those readings were confirmed with additional sampling conducted throughout the year. Data also showed a plume of technetium 99 and chromium in the groundwater beneath the 200 West Area and cobalt 60 was found 100 to 125 feet deep in boreholes.

Energy Assistant Secretary Al Alm visited Hanford and explained his 10-year cleanup plan to accelerate cleanup at many of DOE's nuclear weapons sites. The intent was to demonstrate success by completing cleanup activities at most DOE sites within 10 years, by 2006. Rocky Flats in Colorado and Fernald in Ohio were among the sites targeted for accelerated closure. While it was recognized that cleanup activities at DOE's largest sites, including Hanford, would continue well beyond 2006, certain activities at these sites could also be accelerated. To succeed, the plan required additional funding during this 10-year period, but was expected to result in overall savings to the cleanup program.

Hanford lost $10.1 million in funding to the early closure sites. It was part of $35 million needed for "urgent requirements" elsewhere, including $20 million at Rocky Flats. DOE officials said Hanford's cut would come mostly from planned environmental restoration work. Four million dollars of the $10.1 million was supposedly a loan to be repaid in the next fiscal year. DOE officials had previously said the Hanford budget was not sufficient to meet cleanup needs.

Two specially equipped helicopters conducted a radiological survey of the entire Hanford Site. The survey plotted radiological contamination

"I think when this is all in place, that instead of accelerated cleanup being a budding idea, it will be a reality. And yes, there are all kinds of perils, but I believe this will happen."

– Hanford Site Manager John Wagoner, who said DOE was reassessing how Hanford could be cleaned up faster and cheaper. (*Tri-City Herald*, January 13, 1996).

"For years, the level of progress here seemed to inch up slowly. Now, there has been a stride and that makes a 10-year cleanup possible."

– Energy Assistant Secretary Al Alm, explaining his 10-year cleanup plan. (*Tri-City Herald*, July 25, 1996).

at Hanford and served as a baseline to track any movement of the contamination since the last survey in 1988.

DOE announced that the TY Tank farm was the first to be "Controlled, Clean and Stable." This classification required removal of all pumpable liquids from any single-shell tanks, installation of remote computer monitoring equipment, removal of surplus contaminated equipment from around the tanks, decontamination of above-ground equipment surfaces, and covering the tank farm with clean gravel to shield against contaminated soil. The tank farm contained six single-shell tanks, five of which were known or suspected leakers.

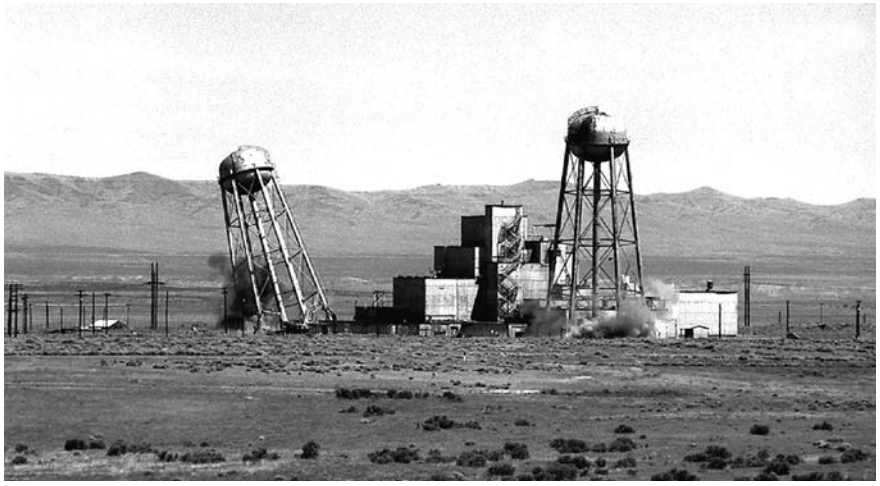
DOE announced plans to begin pump-and-treat operations to remove chromium from groundwater in several locations along the Columbia River. The chromium — used in cooling water in Hanford reactors to inhibit corrosion — was entering the Columbia River in the Hanford Reach, a prime salmon spawning area. The pump-and-treat systems were expected to be operating in the D and H Areas by March 1997 and in the K Area about three months later.

Hanford's waste evaporators completed the boiling off of one million gallons of liquid. It reduced the volume of liquid wastes in the tanks to 54 million gallons. Since 1994, the evaporators had eliminated eight million gallons of liquid from the tank farms.

"Every time we reduce waste volume by one million gallons we avoid spending about $75 million to build a new tank."

– Ami Sidpara, DOE.
(DOE News Release, June 10, 1996).

Hanford's K Area, with a liquid waste disposal trench at the top of the photo. ▼



◀ *The demolition of C Reactor's water towers.*

As part of the "cocooning" of C Reactor, the two water towers at the reactor were leveled by explosives. The 175 foot tall towers stored 300,000 gallons of cooling water. They were built in 1952 and used until the reactor was shut down in 1969.

In June, DOE completed removal of all plutonium from PUREX and shut off its criticality alarm.

Hanford Manager John Wagoner sent a memo to Benton County planners in July, saying agriculture should not be considered on the Hanford Site for the "foreseeable future." Benton County had sought comments on a preliminary plan on what Hanford lands should be set aside for habitat. Wagoner said current and future waste sites and the contaminated groundwater should rule out agricultural use, and that irrigation would speed migration of contaminants into groundwater and the Columbia River.

Westinghouse workers completed deactivation of the Fuels Development Laboratory (the 308 Laboratory). Annual upkeep costs dropped from $12 million to $160,000. The 308 Laboratory was used in 1960 to make fuel for a nearby test reactor.

The Environmental Restoration Disposal Facility was dedicated in July. The $45 million disposal pit was 1,000 feet long, 500 feet wide and 70 feet deep. It eventually could be expanded to hold up to 12 billion yards of contaminated soils.

Construction began on a new cross-site waste transfer line. It was expected to be complete in August 1997 and move wastes in February 1998. It would replace a barely-functional 40-year old system.

Energy Secretary Hazel O'Leary made two visits to Hanford — one in April, the other in October. During her first visit, she provided $5.5 million for economic diversification efforts, met with whistleblowers, and dedicated the Canister Storage Building. In October, she participated in the dedication of the Environmental and Molecular Sciences Laboratory.

Fluor-Daniel Hanford Company was awarded a five year, $4.88 billion contract in August to manage the Hanford Site. Fluor was one of three companies that submitted bids. Options for a five year extension could make the contract worth $9.56 billion. Westinghouse Hanford had been the primary Hanford contractor since 1987. Fluor

"For a lot of the old-timers who were here when PUREX was a big cog in the production effort, it was kind of a sad day. To turn off the criticality alarm means an era really has come to an end."

– DOE Spokesman Guy Schein. (Tri-City Herald, June 21, 1996).

▲ *The first load of waste is dumped at Hanford's Environmental Restoration Disposal Facility.*

"Before contract reform, the Department of Energy paid for simply showing up. Not anymore. If the contractors don't deliver on their commitments, we don't deliver on their dollars."

– Energy Secretary Hazel O'Leary on the award of a five year $4.88 billion contract to Fluor-Daniel Hanford Company to manage the Hanford Site. (DOE News Release, August 6, 1996).

"The robust culture and attitude that a new firm brings to Hanford underscores the new mission of Hanford. No longer is the purpose here to produce nuclear weapons, but to clean up the site."

– Energy Under Secretary Tom Grumbly. (Tri-City Herald, August 7, 1996).

"We are poised and ready for the innovative ideas of the Fluor-Daniel Hanford team."

– Hanford Manager John Wagoner, as Fluor-Daniel Hanford took over as the lead contractor at Hanford. (DOE News Release, October 1, 1996).

"Any movement away from the cleanup mission to one involving weapons production would be at cross purposes with the Department's commendable and increasingly successful efforts to strengthen and focus the Hanford cleanup mission."

– Letter from Oregon's Congressional delegation to Energy Secretary Hazel O'Leary, opposing the re-start of the Fast Flux Test Facility. (October 15, 1996).

took over October 1. Most Westinghouse workers accepted jobs with Fluor or its contractor team. Nearly 600 Hanford workers chose early retirement. Shortly after taking over Fluor announced 750 Hanford Site layoffs were expected during 1997. Ironically, Westinghouse received their highest rating since 1989 for the six month period which ended September 30, 1996.

DOE said it would retain control of the Arid Lands Ecology Reserve to use as a buffer zone. DOE said it would negotiate an agreement with the U.S. Fish and Wildlife Service to manage the area while allowing greater public access. The Bureau of Land Management and the Yakama Indian Nation had proposed to assume control of the reserve.

The Environmental Protection Agency said in August that the 1100 area was cleaned up and should be removed from its Superfund list. Meanwhile, 71 acres of the 3000 Area was transferred to the Port of Benton.

President Clinton signed the Defense Authorization Bill, which included authority for DOE site managers to negotiate changes in consent agreements such as the Tri-Party Agreement. The legislation also designated Hanford as a "National Environmental Cleanup Demonstration Area."

The fate of the Fast Flux Test Facility (FFTF) remained a subject of considerable lobbying. In March, the Washington State Legislature passed a resolution which supported restart of FFTF. Washington Senator Slade Gorton and Representative Doc Hastings later sent Energy Secretary O'Leary a letter in support of restarting the reactor. Oregon's seven member Congressional delegation and Oregon Governor John Kitzhaber responded with their own letters, asking O'Leary not to produce tritium at FFTF. Fourteen environmental groups had earlier sent a letter to O'Leary, saying restarting FFTF would hurt Hanford cleanup. DOE officials meanwhile, could not agree on whether FFTF could produce a sufficient amount of tritium for the nation's nuclear weapons program.

After eight years of negotiation, Benton County and DOE reached agreement on payment in lieu of taxes for Hanford land taken off the local tax rolls. DOE would pay the county $11.2 million. Grant and Franklin counties had reached agreements earlier and received their first payments at the beginning of the year.

Tank Waste Treatment

A National Academy of Sciences study released in February suggested many Hanford tanks should be studied to see if wastes could be permanently stored in them. Barriers would be installed to protect the surrounding environment. The Academy did not recommend this as an action but suggested it was deserving of further study.

In August, DOE issued its final Tank Waste Remediation System Environmental Impact (EIS). The EIS assessed how to manage and dispose of Hanford's tank waste and 1,930 cesium and strontium capsules that were by-products of tank waste. The EIS was necessary because major assumptions made in a 1988 EIS had changed considerably or had not been considered at all. The 1988 Hanford Defense Waste EIS envisioned the use of grout for low-activity waste and B Plant for pre-treatment. Both of those plans had since been changed. The 1988 EIS also had not predicted the tank safety issues which had to be resolved through much of the early 1990s and also did not account for the signing of the Tri-Party Agreement and its associated milestones. The preferred alternative for tank waste treatment was a phased approach, which would include a demonstration of the separations and immobilization process for selected tank waste and then scaling up and constructing larger treatment facilities to treat the remaining tank waste. For cesium and strontium capsules the preferred alternative was continued storage for at least the next 10 years.

DOE moved forward with its plans to "privatize" the tank waste treatment project. In February, DOE solicited bids for the program in which private companies would pay all up-front design, construction and operating costs without federal appropriations. They would get paid only when they had turned waste into glass. DOE's intent was for private industry to take on a large share of the risks of this incredibly complex and expensive project.

Two firms submitted proposals in May for the tank waste vitrification privatization project. The two teams were led by BNFL Inc. and Lockheed Martin. They were each awarded $27 million fixed price contracts in September to begin defining the technical, regulatory, and business and financial elements needed for privatized tank treatment facilities.

"In the past, the Department has been long on promises and short on results in its efforts to solve the Hanford tank waste problem…we expect at least a 30 percent savings over the traditional ways of doing business."

– Energy Secretary Hazel O'Leary on DOE's plans to vitrify Hanford's tank wastes under a privatization contract. (DOE News Release, February 20, 1996).

"This is a major step toward bringing the innovation and efficiency of the private sector to bear on DOE's environmental cleanup mission."

– Ron Izatt, Hanford Deputy Manager on the receipt of two bids for the tank waste privatization project. (DOE News Release, May 13, 1996).

Tank Safety

In June, DOE removed four tanks from the ferrocyanide Watch List. All remaining tanks were removed from the ferrocyanide Watch List in September. DOE closed this out as a safety issue after determining the concentrations of ferrocyanide were too low for a credible accident to occur. DOE also determined it would not add 25 tanks to the Watch List for flammable gasses. DOE scientists concluded the sludges in the tanks did not generate enough gases to require extra safety measures.

Around the DOE Complex

The high-level waste vitrification plant at Savannah River began operation in March, several years behind schedule. Operating problems would persist for some time.

A number of leadership changes occurred at the U.S. Department of Energy. In May, the U.S. Senate confirmed Tom Grumbly as DOE Under Secretary and Al Alm as Assistant Secretary for Environmental Restoration and Waste Management. Late in the year, Energy Secretary O'Leary submitted her resignation. U.S. Transportation Secretary Federico Peña was nominated by President Clinton to replace O'Leary.

In December, DOE announced a dual approach to dispose of surplus plutonium. Some of the plutonium would be converted to a fuel and used in reactors, the remainder would be vitrified. Hanford was considered a potential site for these activities.

"For these alternatives (that leave waste in the tank), the risk analyses in the EIS show massive plumes of radioactive material slowly moving across the Hanford Site and into the Columbia River for hundreds to thousands of years."

– Testimony of Michael Grainey, Assistant Director, Oregon Department of Energy, on Oregon's strong support of DOE's preferred alternative to retrieve Hanford's tank waste and vitrify it. (May 7, 1996).

1997

"Either they really don't know what they have out there or they are being evasive. Neither of these options is very pretty."

– Lynn Stembridge, Hanford Education Action League, after a chemical storage tank exploded at Hanford's Plutonium Reclamation Facility. (*Tri-City Herald*, May 16, 1997).

The Cleanup

The U.S. Department of Energy (DOE) said it would need $12.5 billion over the next 10 years to speed up Hanford's cleanup. The conclusion was part of the first draft of DOE's proposed 10 year master cleanup plan for DOE sites. The plan was designed to complete all work at smaller sites and accelerate some work at major sites.

DOE conducted a strategy meeting in Salt Lake City in July with regulators, tribal representatives and others to determine ways to close anticipated funding gaps in fiscal years 1998 and 1999. The group agreed on goals of finding $75 million in work performance efficiencies in fiscal year 1998 and $160 million in efficiencies in fiscal year 1999. By August, DOE budget projections showed Hanford's budget dropping by $318 million over the coming two years. The report said the cleanup budget for fiscal year 1998 would fall $98 million short of costs to comply with the Tri-Party Agreement. The gap could reach $150 to $220 million in fiscal year 1999.

New facilities continued to come on-line at Hanford.

In March, the Waste Receiving and Processing Facility began limited operations. It was Hanford's first major solid waste processing

◄ *An analytical cell inside the Waste Receiving and Processing Facility*

"We believe the 2006 plan will significantly delay negotiated cleanup actions in order to allow the Department to focus its spending on the smallest sites. As money is diverted from cleanup at the larger and more complex sites, the hazards increase."

– Letter from John Savage, Administrator, Oregon Office of Energy, to Energy Assistant Secretary Al Alm, expressing Oregon's concerns with DOE's draft Accelerating Cleanup Plan. (September 9, 1997).

"This is no ordinary pipeline. This has to deal with some of the most hazardous stuff on the earth."

– Hanford Site Manager John Wagoner, on the completion of a new 6.2 mile cross-site waste transfer pipeline. (*Tri-City Herald*, September 19, 1997).

"We control the environment but get (rescue workers') heart rates up. They can make mistakes here, but they're not fatal."

– June Ollero, DOE HAMMER program director. (*Tri-City Herald*, September 25, 1997).

"PUREX was the greatest producer of special nuclear defense material in the United States. …That's why the closing of PUREX symbolizes the end of the Cold War."

– Lloyd Piper, Acting Hanford Manager. (*Tri-City Herald*, June 21, 1997).

facility and the first in the DOE complex to handle transuranic wastes.

In September, a ceremony was held to celebrate completion of a new cross-site transfer line — slightly ahead of schedule and under budget. The 6.2 mile transfer line replaced pipes built in the 1940s and last used in 1995.

The HAMMER Training Center was also dedicated in September. The 120 acre facility was the most advanced hands-on safety training complex in the nation. It had 20 training props and would train workers and emergency responders.

Cleanup progress could also be seen with the completion of several key projects.

Hanford workers successfully decontaminated and removed about 10,000 gallons of radioactive solvents from B Plant, four months ahead of the Tri-Party Agreement schedule. Removing the solvents was a major obstacle in meeting an accelerated cleanup schedule for B Plant.

A ceremony was conducted to celebrate the deactivation of PUREX, 15 months ahead of schedule and $75.5 million under budget. Deactivation began in 1993 and ended in May. It cost $147 million and cut annual maintenance costs from $34 million to $1 million.

Fire training at HAMMER's burn building ►

DOE announced that Hanford's last untreated waste stream had been diverted to a disposal facility. It ended a ten year effort to stop the unpermitted dumping of liquids to the ground at Hanford.

Other projects, however, continued to struggle.

Plans to move sludge from the K-Basins into Hanford's high-level waste tanks ran into a snag with the discovery of PCBs in the sludge. Because PCBs fall under more stringent regulatory requirements, major changes in the tank waste treatment program could be needed if the sludge was added to the tanks.

In September, DOE announced an additional 14 month delay for the K-Basins spent fuel project. DOE said more design and safety work were needed. Fluor-Daniel sent Duke Engineering a "cure" letter in December, which outlined several concerns with their handling of the K-Basins project and implied they could lose their contract. DOE approved a new cost estimate for the project in December. The new estimate was $1.08 billion, an increase of $274 million over the previous estimate. The project was now also expected to take until 2003 instead of 2001.

Hanford officials said a five-fold increase in tritium levels in groundwater was not the result of a leak from the K-Basins. The increased tritium levels were found in a monitoring well about 50 feet north of the K-East basin, near the Columbia River. Examination of the basin had found no leaks.

An expert panel studying the vadose zone concluded in a report that the method by which contaminants moved through this area was poorly understood.

DOE confirmed that leaked tank waste had reached groundwater. Two draft Pacific Northwest National Laboratory reports concluded leaked waste from five tank farms in the 200 West Area had reached groundwater.

DOE declared an Unreviewed Safety Question, based on concerns about whether a waste storage tank in the Plutonium Finishing Plant (PFP) complex had leaked and on how much plutonium it contained. The Z-361 tank held about 20,000 gallons of sludge and 200 gallons of liquid.

A chemical storage tank exploded in May at the Plutonium Reclamation Facility, located in the PFP complex. Eight workers were given conflicting instructions and were exposed to a chemical plume. DOE officials said they did not know what similar types of risks might exist on the site and began a complete inventory of chemicals on the site to ensure a similar explosion could not occur. DOE also acknowledged major problems with the response to the explosion. Among the problems — workers received conflicting directions, which resulted in their exposure to a chemical plume; it took too long to declare an emergency; and it took too long to make off-site notifications.

The incident in part prompted Washington Senator Patty Murray to ask Energy Secretary Federico Peña to have DOE review the Fluor-Daniel contract. Murray praised the completion of several projects ahead of

"We have entered into a new era of waste management where past liquid waste disposal practices are replaced by state-of-the-art permitted facilities."

– Liz Bowers, Manager of DOE's Liquid Effluents Program. (DOE News Release, November 10, 1997).

"Fluor-Daniel tried to put some reality into a schedule that in some sense was unrealistic."

– Charlie Hansen, DOE, on the announcement of an additional 14 month delay for the K-Basins project. (*Tri-City Herald,* September 6, 1997).

"Our tank waste is now in the groundwater and is moving into the river."

– Casey Ruud, Washington Department of Ecology. (*New York Times*, October 11, 1997).

"I look at it as slow-motion fallout. Once it's in the groundwater, it'll be almost impossible to retrieve it."

– Tom Carpenter, Government Accountability Project. (*New York Times,* October 11, 1997).

"It's nice to know we're now on the same playing field."

– Suzanne Dahl, Washington Department of Ecology, referring to Ecology's past contentions that leaked tank waste had reached groundwater and DOE's confirmation of that fact. (*Tri-City Herald,* November 26, 1997).

The results of a chemical tank explosion inside the Plutonium Reclamation Facility ►

"I don't want to go back to work on Monday…If they don't know what happened and why, there's still a damn good possibility it could happen again."

– Hanford worker Winston McCulley, following an explosion at Hanford's Plutonium Reclamation Facility. (*Tri-City Herald,* May 15, 1997).

▲ ***Energy Secretary Federico Peña (second from left), Washington Senator Patty Murray and Washington Congressman Doc Hastings at Hanford.***

schedule but wanted DOE to examine safety issues related to the explosion and other accidents, problems in getting a safety management plan approved, and the ability to meet cleanup deadlines. Washington State later fined DOE $110,000 for violations that caused the explosion and for DOE's poor emergency response to the incident.

In September, the Chair of the Defense Nuclear Facilities Safety Board (DNFSB) said corrective actions by DOE at the PFP had been ineffective and might have contributed to the explosion. In a letter to Energy Assistant Secretary Al Alm, DNFSB Chair John Conway said DOE had not yet clearly identified the risks of handling fissile material at PFP and its contractors had yet to formally define which specific activities were necessary before these activities could be safely resumed.

A DOE audit showed Westinghouse was overpaid several million dollars in performance fees. The audit said some work was incomplete or substandard, DOE oversight was weak, or performance goals were too easy and that DOE should try to recover the overpayments. Westinghouse officials did not agree with all the conclusions.

DOE announced Hanford Manager John Wagoner would be "loaned" to Brookhaven National Laboratory on a temporary basis. Brookhaven had recently come under intense scrutiny after a tritium leak forced shutdown of the laboratory's main research nuclear reactor.

Public meetings were conducted to explain the results of the Columbia River Comprehensive Impact Assessment. The effort began in 1993 to assess the effects of Hanford-origin materials and contaminants on the Columbia River environment, river-dependent life, and users of river resources. Additional study was recommended to better understand Hanford's impacts to the Columbia River and to help guide decision making on Hanford waste management, environmental restoration, and remediation.

Energy Secretary Peña made his first visit to Hanford in August. He announced Fluor-Daniel would conduct a review of their effective-

ness and DOE would assess that review. He also expressed concerns about funding and said he would evaluate the Fast Flux Test Facility objectively. While at Hanford, Peña signed an agreement with the U.S. Fish and Wildlife Service for management of the Fitzner-Eberhardt Arid Lands Ecology Reserve. DOE would maintain ownership. Earlier in the year, DOE had disagreed with the conclusions of a General Accounting Office (GAO) report that DOE should get rid of its non-essential lands, including the Fitzner-Eberhardt Arid Lands Ecology Reserve and the Wahluke Slope. The GAO concluded DOE had no use for this land.

Workshops were conducted in Washington and Oregon as part of a pilot for a "National Dialogue." The idea of a National Dialogue on nuclear waste issues was proposed in October 1995 by Washington Governor Mike Lowry to DOE Assistant Secretary Tom Grumbly. Lowry and many others believed important DOE decisions about the management of nuclear materials and waste were being made on a piecemeal basis and their overlapping impacts were not being considered. The National League of Women Voters asked for bids to pilot various workshop and meeting formats. A joint proposal submitted by the Washington League of Women Voters and the Oregon Department of Energy was accepted. Small discussion groups were conducted in Oregon in September and four regional workshops were conducted in October.

Fluor-Daniel's first year at Hanford was a rocky one in many respects. In April, regulators complained that communications with Hanford contractors was not good and had gotten worse since Fluor took over. Reviews by both DOE and Fluor of Fluor's first year at Hanford showed Fluor leadership had not been as strong as DOE had hoped. The reviews showed Fluor was three percent over budget on cleanup projects and 28 percent of 1997's legal cleanup milestones were completed late or were undone.

Hanford was identified as a potential storage site for six metric tons of plutonium from Rocky Flats. DOE wanted to move the plutonium as part of the accelerated cleanup at Rocky Flats.

Tank Waste Treatment

DOE released a record of decision favoring privatization as the process to treat Hanford's tank waste.

Washington's Congressional delegation requested Congress approve sufficient set-aside for the tank waste privatization program. DOE's plans to pay the contractor after waste was vitrified would result in obligations of up to several billion dollars. However, the federal Anti-Deficiency Act forbids a federal agency from promising to spend money which had not been authorized by Congress. Therefore, DOE needed Congress to authorize funds through a

"It was an accident of history that preserved the (Arid Lands Ecology) Reserve since we needed it as a buffer to ensure secrecy… It's ironic that amidst all of this environmental damage, the Reserve survived and remains today a unique and precious natural resource."

– Energy Secretary Federico Peña, after DOE and the U.S. Fish and Wildlife Service signed an agreement for management of the Fitzner-Eberhardt Arid Lands Ecology Reserve. (DOE News Release, August 27, 1997).

"They didn't realize the magnitude of scale going up from Fernald to this."

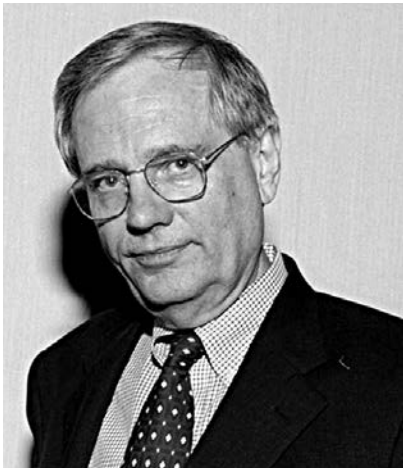
– Todd Martin, Hanford Education Action League, referring to Fluor-Daniel's problems during its first year at Hanford. (*Tri-City Herald*, October 5, 1997).

"I was surprised that they talk and operate more like an oversight body than an advisory board."

– Hank Hatch, Fluor-Daniel President, referring to a contentious relationship with the Hanford Advisory Board. (*Tri-City Herald*, October 5, 1997).

"There have been a number of frustrations, and they've now been identified… And now we need to require Fluor to put corrective actions in place."

– Washington Senator Patty Murray, who requested reviews of Fluor-Daniel's first year at Hanford. (*Tri-City Herald*, November 6, 1997).



▲ *Energy Assistant Secretary Al Alm.*

"My vision of this approach derived not from political expediency or change for change's sake, but from a deep-rooted belief that we owe future generations a legacy of cleanup and completion, not generations of more cost and continued contamination."

– Energy Assistant Secretary Al Alm, as he announced his resignation. (*Tri-City Herald,* November 1, 1997).

"set-aside" for the tank waste vitrification program. These dollars did not actually exist — the set-aside instead was an authorization for a future appropriation of funds. DOE requested a set-aside of $427 million for fiscal year 1998.

Around the DOE Complex

More changes in the DOE leadership occurred throughout the year. In March, the U.S. Senate confirmed Peña as Secretary of Energy. Under Secretary Grumbly submitted his resignation in March. Grumbly then predicted large cutbacks and more layoffs at DOE's former nuclear weapon production sites. He said the biggest challenge facing cleanup was to keep funding coming from Congress.

Energy Assistant Secretary Alm announced his resignation in October, effective at the end of January. He said the 2006 cleanup plan was now official policy.

"It's a hellish job and we liked Al. Hanford was a high priority for him…and he paid us a lot of attention. I liked the 2006 initiative. It was a sound, strategic concept, designed to strike for success early and show people we can make progress. But Al and I might be the only two people who feel that way."

– Dan Silver, Washington Department of Ecology, on Al Alm's resignation. (*Tri-City Herald,* November 1, 1997).

1998

"We are in trouble. We've missed milestones."

– Hanford Deputy Manager Lloyd Piper, about funding projections for fiscal year 2000 that were $80 million short of what was needed to meet legal obligations. (*Tri-City Herald*, February 27, 1998).

The Cleanup

The State of Washington resorted to the threat of legal action to get the U.S. Department of Energy (DOE) to agree to an enforceable schedule for the removal of free liquids from Hanford's single-shell tanks. In February, Washington Governor Gary Locke told Energy Secretary Federico Peña that Washington was prepared to sue DOE for missing Tri-Party Agreement milestones to begin pumping liquids from some single-shell tanks and DOE faced a key deadline July 30 to award a contract to build a high-level waste vitrification plant.

Washington Department of Ecology officials denied a DOE request in March to delay pumping eight tanks. Ecology had previously denied a request to delay pumping six other tanks. DOE said tank safety issues made the delays necessary and they were working on a detailed tank pumping plan.

In May, DOE proposed a four-year delay to complete its program to pump liquids from all single-shell tanks. Washington state officials announced in June they would sue DOE in 60 days for missing two deadlines for pumping radioactive wastes from Hanford's tanks. To that point, 119 tanks had been pumped — leaving 29 of the most difficult with free liquids still remaining inside.

Energy Secretary Bill Richardson and Governor Locke worked out an agreement in principle in October to avoid a lawsuit. DOE agreed

◀ *Washington Attorney General Christine Gregoire announces a tentative agreement with DOE over single-shell tank stabilization. Energy Secretary Bill Richardson, Washington Senator Patty Murray and Washington Governor Gary Locke look on.*

"We are going to hold their feet to the fire…We don't want their money or their fines. We want Hanford cleaned up."

– Washington Governor Gary Locke, who said the state was prepared to sue DOE for missing key Tri-Party Agreement milestones. (*Tri-City Herald*, February 24, 1998).

"I think the state has made it very clear it intends to put pressure on us under the Tri-Party Agreement. We don't need this kind of encompassing pressure to do the right thing. We're already committed to doing it."

– Hanford Manager John Wagoner in response to Ecology's denial of a DOE request to delay pumping eight tanks. (*Tri-City Herald*, March 13, 1998).

"Our patience has run out and the Department of Energy's credibility is wearing thin. We need them to meet milestones, and no more excuses."

– Ecology Director Tom Fitzsimmons, after state officials announced they would sue DOE in 60 days. (State of Washington News Release, June 8, 1998).

"Obviously, disputes aren't going to get the job done."

– Energy Secretary Bill Richardson after agreeing to a consent decree to avoid a lawsuit with the State of Washington. (State of Washington News Release, October 14, 1998).

"I think today shows that the Tri-Party Agreement works. It forced us to come together and work together."

– Washington Senator Patty Murray. (*Tri-City Herald*, October 15, 1998).

"There's no doubt there was little enthusiasm for this…. The vadose zone is intellectually virgin territory."

– DOE Under Secretary Ernest Moniz. (*New York Times*, March 23, 1998).

to a consent decree filed in federal court so that yet-to-be-determined schedules would be enforceable by a judge. DOE would pump the most dangerous tanks first.

A DOE review of tank farm operations showed problems with morale, trust and communications. The review focused on DOE management issues and found staff members believed protesting safety concerns to upper management would hurt their career.

Hanford Site Manager John Wagoner announced that leaked tank waste from the B, BX and BY tank farms in the 200 East Area had reached groundwater. That meant leaked waste from at least eight of Hanford's 18 tank farms was believed to have reached the groundwater and could reach the Columbia River within 20 years.

DOE soon after announced it would develop a plan to address groundwater and vadose zone contamination. Bechtel was assigned the responsibility to integrate all work being done on current cleanup activities. That included sampling, data collection and modeling of soil and groundwater; pumping and treating contaminated groundwater; and research and technology development related to movement and containment of contamination.

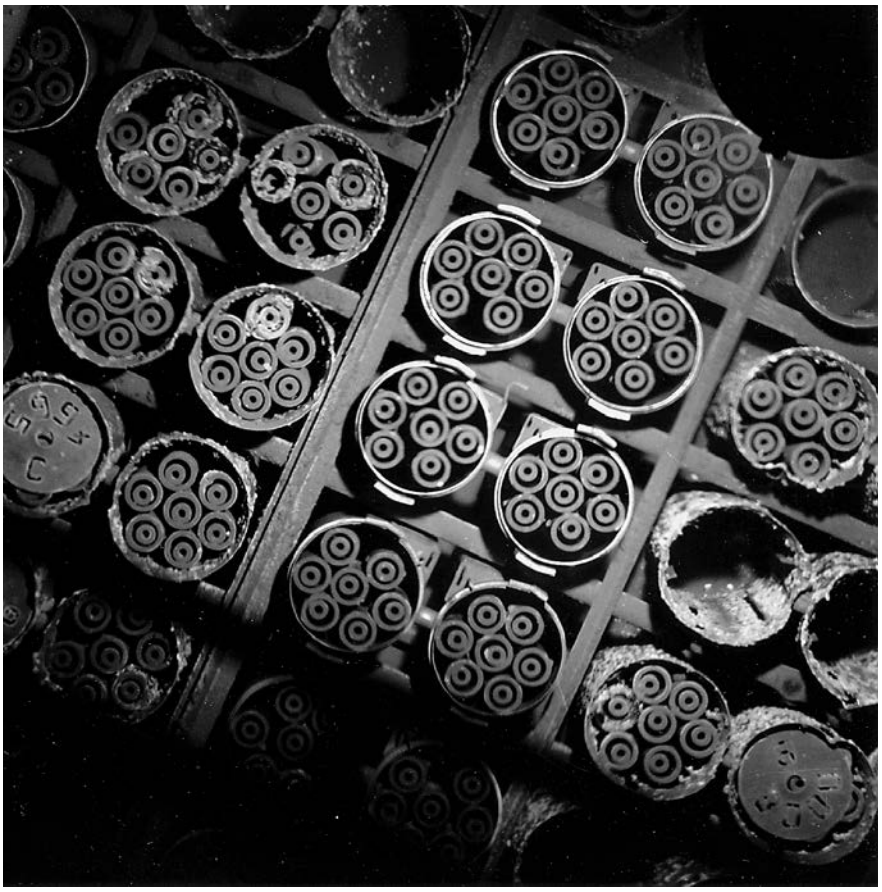
A General Accounting Office (GAO) report said DOE's understanding of how waste moved through the vadose zone to the groundwater was inadequate to make key technical decisions on how to clean up wastes in an environmentally sound and cost-effective manner.

A small amount of plutonium was found in the aquifer just north of the K-Basins, several hundred feet from the river. Hanford officials said the plutonium was most likely from Hanford's production days, when waste water was poured into the ground. It was uncertain whether the plutonium had been there for years or was increasing.

In August, a Los Alamos study increased the estimates of leaks from four tanks in the SX tank farm. The revised leak estimate was 200,000 to 400,000 gallons of waste, about six times more than previous estimates. The report also estimated an additional one million curies of cesium from the four tanks entered the vadose zone. Previous estimates were that all leaked tanks had accounted for about one million curies of cesium.

Hanford's five pump-and-treat systems treated over 270 million gallons of groundwater during the 12 months which ended in September. The systems were designed to intercept and contain plumes of contaminated groundwater before they reached the Columbia River. They had been successful in removing carbon tetrachloride and chromium from the groundwater and keeping some strontium 90 from entering the river.

Hanford's floundering K-Basin spent fuel project received considerable scrutiny — including that of a Congressional oversight committee. In March, the House Commerce Committee's Oversight



◄ *Spent nuclear fuel elements in one of the K-Basins.*

and Investigations Subcommittee launched an investigation after project costs jumped and the completion date slipped.

A DOE letter to Fluor-Daniel and Duke Engineering expressed strong concerns about problems at the K-Basins. The list of problems included the inability to identify and correct problems, keep to a budget, and to lock-in schedules and cost estimates.

Fluor-Daniel Hanford President Hank Hatch said in April that the K-Basins project could be delayed up to three additional years and cost even more. Hatch said Fluor was disappointed with how Duke Engineering — their subcontractor on the project — had responded so far to its "cure" letter. By May, Fluor said Duke had made enough progress to cancel the cure letter and in June, DOE approved a one year extension on Duke Engineering's Hanford contract to manage the K-Basins project — despite the difficulties.

During a House Subcommittee hearing in May, Wagoner said K-Basin costs might go up an additional $276 million to almost $1.4 billion, and completion might be delayed by two more years to 2005. In 1995, DOE estimated the cost at $814 million and completion at 2001.

By September, DOE, the U.S. Environmental Protection Agency (EPA) and Ecology agreed on a new cleanup timetable for the K-Basins. Workers would begin removing spent fuel from the basins by November 30, 2000 (this Milestone was eventually missed by

"Not only is mitigation of an urgent risk to the Columbia River not being realized, but also other Hanford cleanup work is having to be deferred to cover cost increases for the (spent fuel program)… The project should be perceived as having a strong sense of urgency, but it does not. Delays occur, commitments are missed, but accountability does not appear to drive the management response."

– Letter from Charlie Hansen, DOE, to Fluor-Daniel and Duke Engineering. (March 22, 1998).

"An 84 percent cost overrun and a 19 percent probability of meeting the schedule… I do believe the wheels fell off."

– Texas Representative Joe Barton, commenting on Hanford's K-Basin project. (*Tri-City Herald*, May 13, 1998).

"I am willing to put every dollar, every bit of profit on that schedule. We are willing to live by it."

– John Norris Jr., President of Duke Engineering and Services commenting on a new schedule for the K-Basins. (*Tri-City Herald*, May 13, 1998).

Barrels containing oil with depleted uranium shavings discovered in Hanford's 300 Area

"It would be an abandonment of every commitment the United States government has made to the people of the state. It would be wholly unacceptable to us. There would be no other course but to seek relief from the courts."

– Dan Silver, Washington Department of Ecology, on a proposal to cut funding to DOE's environmental cleanup program by $500 million. (*Tri-City Herald*, April 23, 1998).

"We're putting at risk the Columbia River. The vitrification plant is not some hypothetical it-would-be-nice. It is, in fact, a necessity for us to move forward…hopefully in a timely way."

– Washington Attorney General Christine Gregoire, about proposed Hanford funding cuts. (*Tri-City Herald*, April 24, 1998).

"Setting the budget for Hanford without consideration of the goals for cleanup is a short-run solution that will make future cleanup measures more complicated and more expensive. Ultimately, there will be no budget gain from sacrificing progress on the cleanup at Hanford."

– Letter from Oregon Governor John Kitzhaber to Energy Secretary Federico Peña and Office of Management and Budget Director Franklin Raines. (May 19, 1998).

only one week). All fuel would be removed from the basins by December 31, 2003 (this Milestone was eventually completed in October 2004, 10 months late) and cleanup of the basins, including removal of sludge, debris and water, would be completed by July 31, 2007 (some of this work is still underway). Estimates to clean up the K-Basins rose to $1.59 billion.

Excavation of a disposal site in the 300 Area was halted in April when several hundred barrels were found that were believed to contain uranium metal shavings. The disposal site operated from 1955 to 1961.

DOE officials said funding projections for fiscal year 2000 were $80 million short of what they needed to meet legal obligations.

Representative Duncan Hunter of California, chair of the House National Security Committee's defense procurement committee, considered cutting DOE's environmental management budget by $500 million. Such a cut could have resulted in 1,250 layoffs at Hanford and slow or stop most cleanup work. Hunter was a critic of DOE's cleanup efforts and believed defense programs had been cut too severely.

After meeting with members of Washington's Congressional delegation, Representative Hunter said he would not make large cuts in DOE's budget, but that DOE was unlikely to receive the full amount it requested for the privatization set-aside.

The Defense Nuclear Facilities Safety Board accused DOE of dragging its feet in cleaning up some of the most contaminated facilities at Hanford and other defense production sites. DOE officials reluctantly admitted part of the problem was a lack of funding.

A team of 30 federal and state inspectors began a "multimedia" investigation at Hanford to check for compliance with federal and state environmental laws. The investigation — by EPA and the Washington Departments of Ecology and Health — was the first to be conducted at Hanford.

EPA declared the 90,000-acre Wahluke Slope had no more significant environmental problems and should be removed from the national priority cleanup list for Superfund sites. It contained former antiaircraft and missile sites used to protect Hanford during the Cold War.

Hanford contractors began filling two waste trenches just north of the 300 Area with clean dirt. From 1975 to 1994, Hanford pumped one to 1.5 million gallons of contaminated liquids a day from the 300 Area's laboratory and nuclear fuel fabrication operations into the trenches. The water and other liquids contained uranium, cobalt, arsenic and PCBs. The trenches were 12 feet deep, 10 feet wide, 1,535 feet long and just under one-quarter mile from the Columbia River.

Fluor-Daniel Hanford's second year at Hanford continued with a number of struggles. DOE proposed a $140,625 fine for Fluor-Daniel in March, the largest fine ever levied against a Hanford contractor. Most of the fine was for poor handling of plutonium within the Plutonium Finishing Plant. The remainder of the fine covered emergency response problems during the May 1997 explosion in a chemical tank.

In contrast, Bechtel Hanford, which earned its seventh consecutive "outstanding" grade and its best-ever rating, was awarded a three year contract extension. The contract's fee structure was changed so it would be based 100 percent on performance.

DOE released its "Accelerating Cleanup: Paths to Closure" plan for Hanford in July. The plan estimated Hanford's cleanup costs through 2046 at $50.8 billion in 1998 dollars or $85.3 billion after factoring in inflation.

The one millionth ton of waste was removed from a site near the Columbia River and deposited in the Environmental Restoration Disposal Facility in July.

While a number of Hanford production facilities were being successfully shut down, new facilities needed for the cleanup were ramping up.

Hanford's Waste Receiving and Processing facility received start-up approval from DOE in September. It was the first operating facility in the DOE complex designed specifically to prepare transuranic waste for shipment to the Waste Isolation Pilot Plant in New Mexico.

"It would not be forthright to sit here and tell you there are not funding challenges at Hanford."

– James Owendoff, Acting Energy Assistant Secretary. (*Tri-City Herald*, June 3, 1998).

"We've cleaned up all of the outlying areas of the site. I would not pretend these are the most significant or important portions."

– Doug Sherwood, Hanford Project manager for the U.S. Environmental Protection Agency. (*Tri-City Herald*, June 3, 1998).

"I absolutely expected better. I know Fluor expected better."

– Hanford Manager John Wagoner, after Fluor earned only 55 percent of its fee for its first year of managing Hanford. (*Tri-City Herald*, June 25, 1998).

"...Radioactive waste seeping through the soil or being discharged into the air recognizes no state boundary."

– Oregon Senator Gordon Smith, in remarks to the U.S. Senate before they approved a "Sense of the Senate" Amendment as part of the U.S. Senate's Defense Authorization Bill. It gave Senate backing that Oregon should remain strongly involved in Hanford issues. (June 24, 1998).

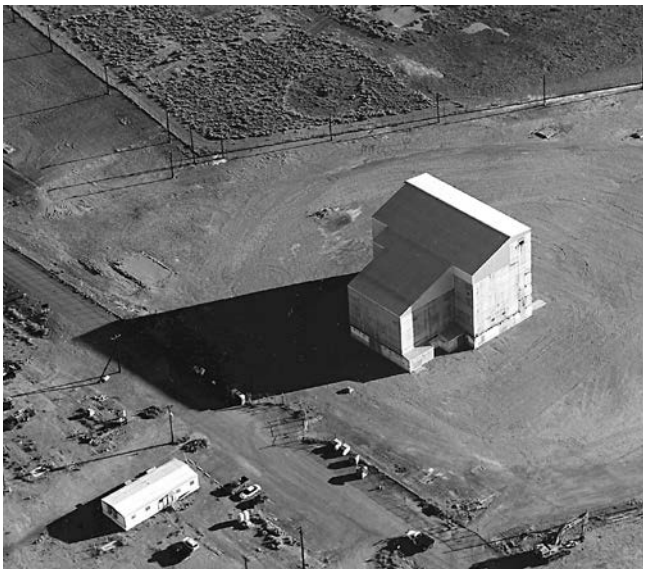
"We've indicated to DOE that where (DOE) can make a good case for a delay, when we do see progress occurring, we are willing to consider a new schedule. Our concerns mostly focus on projects where nothing is getting done without a good reason."

– Sheryl Hutchinson, Ecology spokeswoman, after Ecology approved a four month extension to a Tri-Party Agreement milestone for N Reactor. (*Tri-City Herald*, March 27, 1998).

Deactivation of the last of Hanford's nine plutonium reactors — N Reactor — was finished eight days ahead of its revised schedule. Ecology had earlier approved a four-month extension to a Tri-Party Agreement milestone after more contamination was found than expected in the spent fuel basin. Entrances to the contaminated areas and buildings were closed off and most of the contaminated water and equipment removed.

B Plant was deactivated four years ahead of schedule and $100 million under budget. The 800 foot long facility was built during World War II, closed in 1952, then reopened in the 1960s to separate cesium and strontium from tank wastes. The facility closed again in 1984. Nearly 2,000 cesium and strontium capsules would continue to be stored in an adjacent building. Annual maintenance costs for the facility dropped from about $20 million to $750,000.

Removing radioactive fuel spacers from a storage silo was part of the deactivation of N Reactor. ►



▲ ***Before and after photos show the dramatic changes at C Reactor following successful cocooning of the former plutonium reactor.***

Energy Secretary Richardson visited C Reactor in October to celebrate completion of the reactor cocooning project. The cocooning involved removal of 23 of 24 reactor site buildings and construction of a new high-strength corrosion-resistant galvanized steel roof. Workers removed 70 tons of lead, 1,000 tons of steel, 12,000 tons of concrete and 1,700 tons of soil. More than 15,000 tons of low-level waste was sent to the Environmental Restoration Disposal Facility. The reactor would now sit for 75 years to allow the radioactivity to decay.

The 1100 Area was shifted from federal control to the Port of Benton. The site included two large buildings, 24 smaller buildings, Stevens Drive and the southern portion of the Hanford railroad. DOE no longer needed the 768 acre area, which had been cleaned of contamination.

Public meetings were held in January to consider whether to remove milestones related to the Fast Flux Test Facility (FFTF) from the Tri-Party Agreement until after DOE decided the fate of the reactor. More than 8,000 comments were received, most opposing removal of FFTF milestones from the Tri-Party Agreement.

Meanwhile, new production missions continued to be explored for the FFTF. About 200 people showed up at a DOE hearing in November both to support and oppose the idea of creating plutonium 238 for the United States' space program. Hanford was one of several potential sites being considered to manufacture plutonium 238 to power spacecraft, as well as a potential site to assemble the plutonium 238 batteries.

In December Energy Secretary Richardson announced FFTF would not be used for tritium production. A new federal study had concluded earlier in the year that FFTF could not meet the nation's current demand for tritium. Potential other missions for the reactor would be decided in the spring of 1999.

"The Hanford skyline has been forever changed, and will change even more based on the success of this project."

– Hanford Site Manager John Wagoner, referring to the cocooning of C Reactor. (DOE News Release, October 14, 1998).

"After examining the different options, I have decided that the Fast Flux Test Facility will not play a role in producing tritium."

– Energy Secretary Bill Richardson. (DOE News Release, December 22, 1998).

"In searching for John's successor, we will be looking for an individual who understands the cleanup challenges of the Hanford Site, who will keep our commitments to protect the Columbia River, the community and our workers, and who will work in partnership with the state, EPA and Tribal Nations to meet our cleanup obligations under the Tri-Party Agreement. In the short time we've worked together, I've been impressed by John's mastery of the issues, and his professionalism in what I consider to be one of the most important and difficult jobs in the DOE complex."

– Energy Secretary Bill Richardson, commenting on John Wagoner's upcoming retirement. (DOE News Release, December 3, 1998).

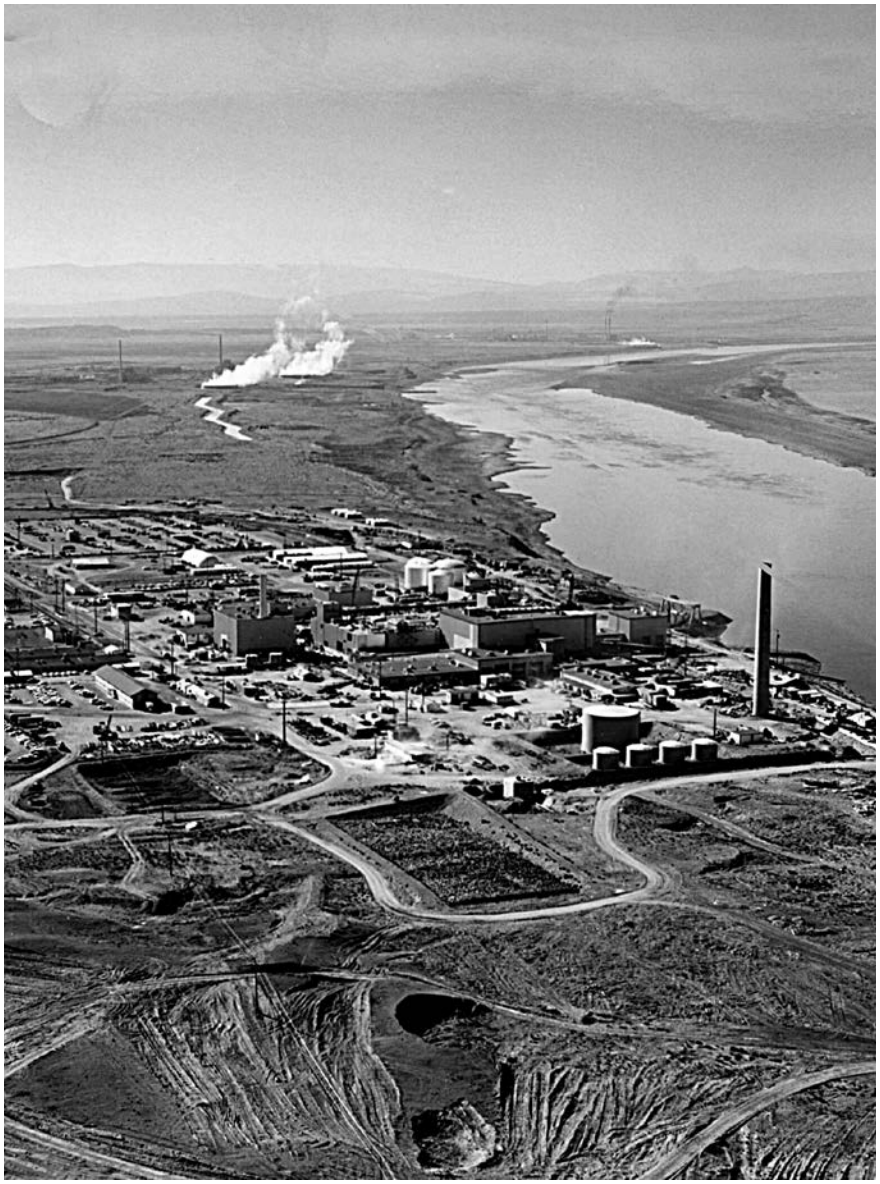
"This has been the toughest, most rewarding challenge of my career. I'm proud of the work we've done…and the new programs we've launched to attack the problems efficiently and effectively."

– Hanford Manager John Wagoner. (DOE News Release, December 3, 1998).

Beginning in October, people who lived downwind of Hanford were able to provide personal information about their diet and where they lived and request an estimate of how much radiation they likely were exposed to from radioactive iodine 131 released to the air from Hanford between 1944 and 1957. The Hanford Individual Dose Assessment Project provided a free estimate of how much radiation dose people's thyroid gland received.

Fruit flies spread contamination around offices and shops at Hanford. The fruit flies were apparently attracted to a sugary substance used to seal areas that may have radioactive contamination. At least 13 contaminated spots were found.

Energy Secretary Richardson announced Hanford Manager Wagoner would retire in January. James Hall, the Manager of Oak Ridge, was named acting manager.



Hanford's N Area in the early 1960s. ►

Tank Waste Treatment

A provision was inserted into the Defense Authorization Bill by Representative Doc Hastings which created a new Office of River Protection at Hanford to oversee and direct cleanup of Hanford's waste tanks.

BNFL and Lockheed submitted their proposals in January for constructing and operating tank waste treatment and immobilization facilities. In a blow to the idea of competition, DOE rejected Lockheed's bid in May, saying its technical risk was unacceptably high. DOE continued to negotiate with BNFL.

DOE sent a report to Congress on its proposed contract with BNFL to begin vitrification of Hanford's tank waste. The proposal increased the cost and delayed start-up, but the facilities would have much longer lives — 30 years instead of five to nine years — with more flexibility to expand over time. The estimated target price to build and operate high and low-activity waste plants was $6.9 billion in 1997 dollars. The plants would begin glassifying wastes in 2006 or 2007. Waste from 11 of Hanford's 177 tanks would be vitrified by 2018.

Ecology officials announced that despite numerous concerns, they supported the proposed Hanford tank waste glassification contract with BNFL Inc. Ecology wanted guarantees in the Tri-Party Agreement that addressed their concerns.

DOE signed a contract in August with BNFL Inc. to convert Hanford's tank waste into glass. During the initial 24-33 month period BNFL would complete 30 percent of the facility design, obtain regulatory permits, and obtain financing.

A GAO report said the BNFL contract carried substantial financial risk for DOE. The GAO report also raised concerns about whether the vitrification technology BNFL developed would work at Hanford.

Tank Safety

DOE declared an Unreviewed Safety Question in March for tank SY-101 because of rising waste levels inside the tank. The tank contained 1.12 million gallons of waste and the level in the tank had risen nearly five inches during the past year. By December, the level in the tank had risen several more inches.

A decade-long, $48 million project to improve ventilation in four tanks was completed.

DOE began waste removal tests at tank C-106 but suspended work after about two hours because of higher than expected exhaust emissions. Eleven workers were examined after potential exposure to the emissions.

DOE removed 18 tanks from the organic complexant Watch List in December (eight of these were also on the hydrogen Watch List) and closed the safety issue related to organic complexants. The action left 28 tanks on the Watch List.

"The extreme secrecy imposed by contract negotiations has barred the Regulators, States, Tribes and stakeholders from having any role in the review of the (privatization) proposals. Each of these groups has major concerns and interests in ensuring that the proposed plan is a good plan. None of us can do so under the current contracting limitations."

– Letter from Mary Lou Blazek, Administrator of the Oregon Department of Energy's Nuclear Safety Division to Hanford Site Manager John Wagoner, expressing frustration at the lack of information about the privatization proposals. (June 24, 1998).

"We looked at some very fast-track schedules...But quite frankly, they presented a high risk. DOE could see it was not sensible to force a contractor to meet an unrealistic schedule."

– Maurice Bullock, President of the BNFL Team on its proposed contract with DOE that delayed start-up of the Hanford vitrification facilities. (*Tri-City Herald,* July 22, 1998).

"The revised approach represents a dramatic departure from DOE's original privatization strategy of shifting most financial risk to the contractor."

– GAO Report on DOE's contract with BNFL for waste vitrification. (GAO/RCED-99-13, October 1998).

"Resolving this safety issue moves us closer to our goal of resolving all high-priority safety issues at Hanford."

– James Owendoff, Acting Energy Assistant Secretary, after DOE closed the tank Watch List for organic complexants. (DOE News Release, December 17, 1998).

"I am frustrated. Who do you call?"

– Washington Senator Patty Murray, referring to the numerous vacancies and acting positions at DOE. (*Tri-City Herald,* April 7, 1998).

"It seemed like DOE has been a political backwater for the second part of the Clinton administration. It's nice to see someone with a relatively high profile and knowledge of energy issues, considering he has (DOE) sites in his own back yard."

– Todd Martin, Hanford Education Action League, on the nomination of Bill Richardson as Energy Secretary. (*Tri-City Herald,* June 18, 1998).

"The Energy Department determined that Hanford's cleanup mission is critical and should remain its top priority."

– DOE News Release announcing Hanford would not play a role in disposal of the nation's weapons-grade plutonium. (June 23, 1998).

Around the DOE Complex

DOE released its draft 2006 plan, re-titled "Accelerating Cleanup: Paths to Closure." The plan requested Congress appropriate $5.75 billion a year plus additional money for the privatization set-aside. This amount was $3.5 billion short of funds needed through 2006 to meet all DOE cleanup obligations.

In April Energy Secretary Peña announced his resignation, effective June 30.

President Clinton nominated Bill Richardson, U.S. Ambassador to the United Nations and a former Congressman from New Mexico, as Energy Secretary. The Senate confirmed Richardson's appointment in July.

The League of Women Voters conducted workshops in San Diego and Chicago in June to bring together stakeholders from many DOE sites to discuss nuclear waste disposal and other related issues. The two workshops were considerably less than earlier proposals for a "National Dialogue" on nuclear waste. More than 70 citizen and environmental groups boycotted the two workshops. A number of Hanford stakeholders participated in both workshops.

A GAO audit criticized DOE for spending $2.5 billion over the last decade on new technology development for cleaning up its nuclear weapons sites but using less than one-fifth of the new technologies.

A DOE draft Environmental Impact Statement recommended against Hanford playing a role in disposing of the nation's weapons-grade plutonium. The study instead favored the Savannah River Site or the Pantex plant near Amarillo, Texas.

DOE reached a settlement with environmentalists to end a nine year old lawsuit filed by the Natural Resources Defense Council and 38 other environmental groups. DOE would provide $6.25 million for citizen groups to monitor and finance independent technical studies of DOE's waste management programs.

"When you're out on the site, you feel an overwhelming sense of the grandeur of the land, and when you're at the river, you feel the power of the river…The scale of the environmental damage that we have done at the Hanford Site is just amazing. And the challenge to try to remediate that is huge."

– Randy Smith, U.S. Environmental Protection Agency, at a meeting of the Hanford Advisory Board. (December 5, 1998).

1999

"I don't make any claims about this tank. I'm not convinced anyone understands the chemistry and physics involved in this crust."

– Donald Oakley, a U.S. Department of Energy consultant, referring to the growth of the crust in tank SY-101. (*New York Times,* September 27, 1999).

The Cleanup

John Wagoner retired as Hanford Manager in January. Jim Hall, the Manager at Oak Ridge, became acting manager until Keith Klein was named the U.S. Department of Energy's (DOE) new Hanford Site Manager in March and took over in May. Klein had been the Acting Manager for DOE's Carlsbad, New Mexico office since October and prior to that spent four years as Deputy Manager at Rocky Flats. Energy Secretary Bill Richardson also appointed Dick French as Manager of the Office of River Protection. French had run his own engineering and construction management company since 1994 and prior to that was General Manager and President of Kaiser Engineers Hanford.

After a two year suspension, DOE resumed stabilizing plutonium at the Plutonium Finishing Plant (PFP). Fifteen corrective actions were resolved during that time. The stabilization process converted various forms of plutonium to a safer form for long-term storage.

The Hanford Advisory Board (HAB) urged DOE and its regulators to agree to clean-up milestones that comprehensively regulated cleanup at PFP. The HAB said PFP's plutonium represented one of Hanford's greatest risks to Hanford workers, the public and the environment.

DOE took core samples of sludge from tank 241-Z-361, a small tank next to PFP. The tank's 20,000 gallons of sludge was believed to contain about 66 pounds of plutonium. No new waste had been added to the tank for about 20 years and it was nearly forgotten about until a 1997 chemical explosion at PFP forced DOE to assess all potential risks at the complex. Tests had shown flammable gases were not building up inside the tank and DOE believed the chances of a criticality were low. The tank was also not believed to be leaking.

DOE submitted to Congress its fiscal year 2000 cleanup budget request for Hanford. The $1.17 billion request was an increase of $70 million over Hanford's 1999 cleanup budget but still $23 million short of meeting all Tri-Party Agreement obligations. DOE also requested $106 million in set-aside for Hanford's tank waste vitrification program.

DOE projected that level funding in fiscal year 2001 would leave

"You've successfully led Hanford through the difficult transition from production to cleanup… At the same time, you've invited and encouraged those most at risk from Hanford to have a direct say in the decisions and activities at the site."

– Letter from Oregon Governor John Kitzhaber to John Wagoner. (January 6, 1999).

"Keith (Klein)…is the right person for one of the Department's most challenging jobs... Dick (French) knows Hanford and is ready to meet the challenges of cleaning up Hanford's tank waste and protecting the Columbia River."

– Energy Secretary Bill Richardson, on the appointments of Keith Klein and Dick French. (DOE News Release, March 23, 1999).

"Unfortunately, I think 2001 is the year that the train wreck is actually happening [to clean up]."

– Mike Wilson, Ecology, referring to projected funding cuts. (*Tri-City Herald*, Feb 26, 1999).

"It's always important to get the top guy's name on the line...but the proof will be in the pudding. We've had a long relationship with Energy that hasn't always been fruitful and we hope these meetings bear fruit."

– Sheryl Hutchinson, Ecology spokeswoman, on a pledge by Energy Secretary Bill Richardson for "substantial" progress in immobilizing Hanford's tank wastes. (*Seattle Post-Intelligencer,* September 11, 1999).

"This new schedule sets strict, realistic deadlines for dealing with the most volatile and dangerous threats to the Columbia River without further delay."

– Washington Attorney General Christine Gregoire on a court-enforceable schedule for pumping liquid waste out of 29 of Hanford's single-shell tanks. (State of Washington News Release, March 3, 1999).

"Taxpayers have already invested nearly a billion dollars in the Fast Flux Test Facility. We need to respond to that investment by making the best decision on the use of this facility."

– Energy Secretary Bill Richardson. (DOE News Release, May 4, 1999).

the agency $232 million short of meeting its legal obligations for cleanup. If so, programs to remove contaminated soil from the Columbia River and cocooning old reactors would take the hardest hits. There was also increased concern about the privatization set-aside. The preliminary request was $606 million. In the past three years, Congress had authorized only $385 million in set-aside. Since construction was scheduled to begin in 2001 a large increase in the set-aside was essential to keep the program on schedule.

Energy Secretary Richardson and the governors of Washington, Colorado, Tennessee and South Carolina signed an agreement in principle and pledged to work together to help DOE keep its cleanup efforts on track, including lobbying Congress for sufficient cleanup funding. The governors also agreed to cooperate with each other on nationwide cleanup issues such as the transportation of radioactive waste between sites in their states. Richardson promised "substantial, specific progress" in treating and immobilizing Hanford's tank wastes.

A General Accounting Office (GAO) report said DOE's cleanup program would be short of funds by about half a billion dollars each year through 2006, jeopardizing DOE's plans to clean up most of its smaller sites by 2006.

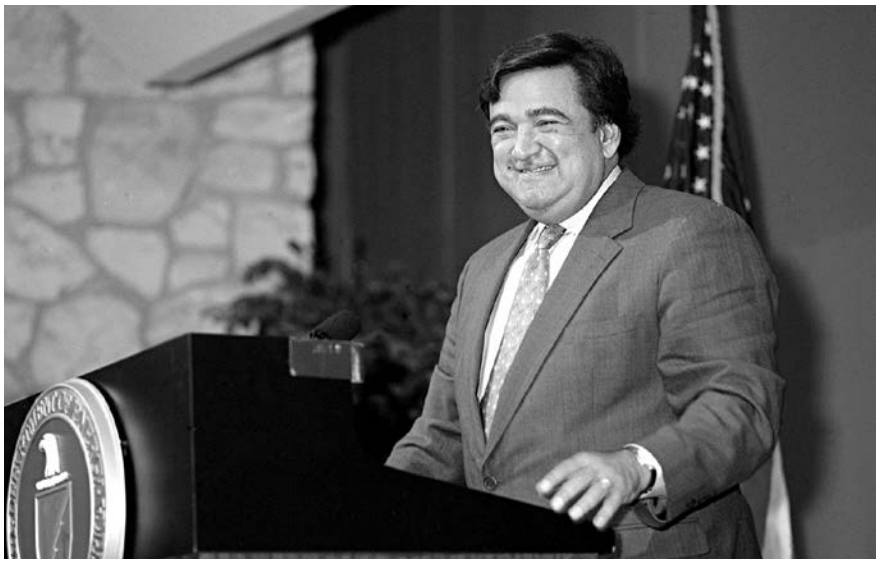
DOE, the State of Washington and the U.S. Environmental Protection Agency (EPA) reached agreement on a court-enforceable schedule for pumping liquid waste out of 29 single-shell tanks. The agreement came eight months after Washington announced its intent to sue DOE. Following a public comment period, language in the Tri-Party Agreement was replaced with a consent decree filed in federal court. Under the new schedule, 98 percent of the remaining six million gallons of liquid waste would be pumped by September 30, 2003. The remainder would be pumped within an additional year.

Operation of the new cross-site waste transfer line began in March. About 750,000 gallons of waste was moved from a tank in the 200 West Area to the 200 East Area. That freed up double-shell tank space in the 200 West Area needed to pump waste from single-shell tanks. It also freed up space for the planned transfer of waste from tank SY-101 later in the year.

The Spokane-based Hanford Education Action League (HEAL) closed its doors in March. HEAL was one of the most influential citizen groups on Hanford issues since it was founded in 1984, but in recent years had seen its membership fall and had difficulty raising funds.

Energy Secretary Richardson announced that DOE would conduct an Environmental Impact Statement (EIS) to review impacts associated with operating the Fast Flux Test Facility. The EIS would evaluate the environmental effects associated with a range of possible uses of the reactor, including medical isotope production and producing plutonium 238 to power spacecraft. Scoping meetings for the EIS drew more than 1,000 people in Seattle, Portland, Hood River and Richland.

Environmental cleanup work began at H Reactor. Contaminated soil and other materials was being removed from old liquid waste disposal sites and hauled to the Environmental Restoration Disposal



◀ *Energy Secretary Bill Richardson at Hanford.*

Facility. Meanwhile, cocooning of other reactors continued on a steady pace. The 200 foot-tall stacks at D and DR reactors were dynamited as part of the cocooning of the two reactors.

Energy Secretary Richardson, during a brief Hanford visit, said DOE would retain ownership of the 140 square mile Wahluke Slope and the U.S. Fish and Wildlife Service would manage the slope as part of the Saddle Mountain Wildlife Refuge. The action would help protect the Hanford Reach, the last free-flowing stretch of the Columbia River.

EPA fined DOE $367,078 in civil penalties, primarily for storing dangerous waste without a permit. Seventeen drums containing solvents were stored outdoors — some for as long as three years — without a permit. DOE was also cited for failing to identify two containers of waste as hazardous.

DOE added the K-Basin spent fuel project to a special "watch list" of troubled DOE projects in July, meaning DOE officials would enact tighter management controls and adopt a harder line in dealing with both contractors and its own staff. Three other DOE projects — two at Los Alamos and one at Savannah River — were also placed on the list.

By September, there was some optimism that the project was finally on track.

Both a DOE Headquarters inspection team and a GAO report said Hanford was doing a better job of managing the K-Basins project. However, past problems used up nearly all of the extra time available in the project schedule and additional delays would likely result in missing Tri-Party Agreement milestones. The GAO report expressed concerns about whether Hanford would be able to meet the schedule to begin moving spent fuel out of the K-West basin by November 2000. The report praised the work of Fluor-Daniel Hanford at resolving outstanding technical issues but cautioned that little planning had been done to continue and eventually complete the work after fuel removal began.

"We're giving back to the people of this community and state a legacy for the future. By protecting the Wahluke Slope, we're protecting the river. I am convinced my proposal is the correct one. If we do not act to protect it now, it will change for all time."

– Energy Secretary Bill Richardson. (*Tri-City Herald*, April 11, 1999).

"Some days, (the river) speaks to me. Some days, it whispers to me. Some days, it cries out in pain. Today, it sings to me."

– Rich Laeumont, Lower Columbia Basin Audubon Society on the DOE decision to have the Wahluke Slope managed as a wildlife reserve. (*Tri-City Herald*, April 11, 1999).

"Compared with conditions that we reported on in May of last year, the amount of progress is substantial, with considerable construction completed and equipment installation under way. Nonetheless…operational readiness issues have become major challenges."

– General Accounting Office Report on Hanford's K-Basins. (GAO/RCED-99-267, September 1999).

"As far as GAO reports go, this is the most positive I've ever seen."

– Phil Loscoe, DOE's acting director for the K-Basins project. (*Tri-City Herald*, October 21, 1999).

Hanford worker moving fuel elements during production years. ►

"I'm not content to be on a track that just barely meets schedule if everything goes according to plan."

– Hanford Site Manager Keith Klein on a plan to accelerate retrieval of spent nuclear fuel from Hanford's K-Basins. (DOE News Release, September 23, 1999).

"Continuing to support cleanup objectives that are inconsistent with projected land uses unnecessarily increases restoration costs."

– DOE Inspector General Report DOE/IG-0446. (June 1999).

"This is an indication of the arrogance from the Department of Energy in blowing off state standards and local, tribal and community-based input. From the state's point of view, the standard ought to be strict. When you limit cleanup, you limit future land use."

– Max Power, Washington Department of Ecology, on a DOE Inspector General report critical of clean up along the Columbia River to unrestricted use standards. (*Tri-City Herald,* July 9, 1999).

New Hanford Manager Keith Klein announced an effort to try and get some of that schedule back. Klein proposed to accelerate the spent fuel retrieval schedule, anticipating the completion of key facilities needed for the project by the end of the year. DOE completed construction of the Cold Vacuum Drying Facility in November and began testing of the fuel retrieval system soon after that.

While most attention was focused on the spent fuel, Hanford officials were also looking at methods to dispose of the K-Basin sludge and especially hoping to develop an alternative to adding the sludge to Hanford's high-level waste tanks. One alternative being considered was to put the sludge in drums, remove all the liquids, solidify it with cement, and ship it to the Waste Isolation Pilot Plant in New Mexico for disposal.

DOE issued a civil penalty of $330,000 to Fluor-Daniel Hanford for violating nuclear safety requirements. Energy Secretary Richardson also issued a compliance order — the first by DOE — with specific milestones to ensure corrective actions were taken. DOE investigators found contractors at Hanford's spent fuel project repeatedly failed to follow the procedures in their own safety plans. Fluor-Daniel paid the fine to DOE out of its corporate funds.

DOE's Inspector General said DOE was wasting $12 million in its work along the Columbia River. The report said cleanup to unrestricted use standards was unnecessary as land use plans called for limited recreation, hunting and fishing by Native Americans, a museum at B Reactor and wildlife preservation. The report drew sharp criticism.

DOE released its final environmental impact statement on proposed land uses for Hanford following cleanup. DOE's preferred option was to limit industrial development to southeastern Hanford and the 200 Areas. Following extensive public comments, DOE recommend expanded

protection for some areas — making national wildlife refuges of the Wahluke Slope, the Fitzner Eberhardt Arid Lands Ecology Reserve, and Hanford's northwestern corner. Industrial development would be limited primarily to the 200 Areas and to southeastern Hanford. Some mining and recreational uses would also be allowed. DOE examined six proposed scenarios, some of which differed greatly. Benton, Franklin and Grant counties favored extensive agriculture and grazing on parts of the Hanford Site while the Nez Perce Tribe recommended making almost the entire site a wildlife preserve.

A robot inspected the inside of Hanford's U plant. The robot traveled through a ventilation tunnel, collected radiation samples and shot video. Less contamination and more dust than expected was found during the robot's five hour trek through the 800 foot-long facility.

An experiment designed to dilute chromium seeping into salmon beds appeared to be successful. Sodium dithionite was pumped into the contaminated groundwater once a month. The chemical converted the chromium into a less mobile and benign form. After six months of this experiment, tests showed the chromium levels dropped considerably once they passed through the test area. Plans were made to expand the project to address a large chromium plume coming from the D Reactor area.

High concentrations of technetium were found in a 200 West Area aquifer. The readings came from a well about 220 feet deep and less than 20 feet from tank SX-115, a single-shell tank built in the mid-1950s and found to be leaking in 1965. The level of technetium 99 found in the well was about 38 times the federal drinking water standards. A Washington Department of Ecology engineer said the worst-case scenario would have the technetium reach the Columbia River within 20 years.

DOE announced that Hanford and the Nevada Test Site were its preferred choices for disposal of mixed low-level and low-level wastes from other DOE sites. A final announcement was expected in January. How much waste could come to Hanford was not clear. State officials said they opposed the plan unless they could get some assurances that Hanford's cleanup — especially tank waste treatment — moved forward, perhaps on an expedited schedule.

"We're going to be protesting this vigorously… I don't know how the federal government can place a new mission on Hanford unless it has really addressed the current one."

– Washington Governor Gary Locke on DOE's preferred choice of Hanford for disposal of waste from other DOE sites. (Associated Press, December 11, 1999).

◀ ***Hanford's mixed low-level waste burial trenches.***

"The study results are sufficiently consistent to indicate that there is no large risk of thyroid cancer or other thyroid diseases associated with the Hanford fallout, although the study probably cannot rule out a small risk, or perhaps a risk among some subgroup of especially susceptible persons…We believe the (Hanford Thyroid Disease) study's investigators incorrectly assumed that exposure estimates calculated for each person were more precise than they actually were."

– Roy Shore, National Research Council. (*Tri-City Herald*, December 15, 1999).

The first few hundred individual radiation dose estimates were mailed to people who lived downwind of Hanford between 1944 and 1957. About 10,000 people had provided information about where they lived and what they ate to the Hanford Individual Dose Assessment Project, the first step in calculating estimated radiation doses from iodine 131 released to the air during Hanford's early years of operations.

Researchers from the Fred Hutchinson Cancer Research Center and the Centers for Disease Control and Prevention released draft results from the Hanford Thyroid Disease Study. The study found no evidence that any kind of thyroid disease was increased as a result of exposure to radioactive iodine released into the air from Hanford from 1944 to 1957. The study results were sharply criticized by downwinders and others. Later, CDC officials said the study results also did not prove that a link did not exist and a National Research Council Review of the study found it was basically sound but that the conclusiveness of the findings were overstated.

ATG began processing mixed waste from Hanford at its new non-thermal mixed waste processing facility in Richland. ATG was using supercompaction and macroencapsulation technologies. After treatment, the waste was returned to DOE for disposal.

Tank Waste Treatment

Former Hanford Manager Mike Lawrence was named to head up BNFL's tank waste glassification program. BNFL continued to develop cost estimates and design plans to construct facilities to treat Hanford's tank waste.

DOE announced in April that low-activity vitrified waste produced during the first stage of the tank waste treatment program would be disposed in four empty grout vaults in Hanford's 200 East Area. The vaults were constructed in 1990 and 1991 for disposal of low-activity waste mixed with grout. The grout program had since been discontinued. Additional low-activity waste would be disposed either in new vaults or new waste trenches.

CH2M Hill announced it was buying Lockheed Martin Hanford Corporation. Lockheed Martin's 1,158 employees were in charge of maintaining Hanford's tanks plus conducting work to prepare the waste for treatment by BNFL. No major changes were immediately planned for Lockheed's operations.

Tank Safety

Hanford workers had significant breakthroughs in greatly reducing risks from two troublesome Hanford tanks — C-106 and SY-101.

Wastes in tank C-106 generated heat and required the addition of water to cool the waste and keep it from damaging the tank structure. Because of leaks from other Hanford tanks there was considerable concern about adding water to the tank.

In March, about 22,000 gallons of waste was pumped from C-106 to an adjacent tank, A-102. The ventilation system in A-102 could cool the waste without adding water. After a few months of study to determine the affect of the pumping on both tanks, Hanford workers in June successfully pumped out more than 55 vertical inches of waste from the tank. By October, most liquids and sludges were removed from the tank and in December, C-106 was removed from the tank Watch List.

Although the periodic "burping" of hydrogen in tank SY-101 had been alleviated with the installation of a mixer pump in 1993, tiny gas bubbles created by the mixer had since resulted in increased growth of the crust — which was threatening to overflow the tank. The crust began to rise in December 1997 and by May had grown about 30 inches to nearly 90 inches thick. Workers successfully released some of the hydrogen gas trapped beneath the crust by using a mechanical arm to open holes in the crust.

In December, tank farm workers moved 90,000 gallons of waste from the tank to an adjacent tank. About 90,000 gallons of water was added to replace the waste and to dilute the approximately 1.1 million gallons of waste that remained in the tank. Levels in the tank dropped about two feet as gas trapped in the crust was released. More waste would be pumped from the tank at a later date.

DOE also declared the criticality issue in the tank farms as resolved. Uncertainties in the quantity and distribution of fissile materials in the tank waste prompted the safety issue to be declared in 1992.

DOE and Ecology reached a settlement concerning leak detection systems in the double-shell tanks. DOE agreed that all 28 double-shell tanks would be equipped with a complete leak detection system by December 31, 1999. That system would include three leak detector probes between the walls of each tank and at least one surface level monitor in each tank.

Ultrasonic testing showed signs of corrosion on the inner wall of one of Hanford's double-shell tanks. The corrosion consisted of tiny pits, about 0.1 inch deep within the half-inch thick wall. The corrosion was found in tank AN-105, which contained 1.16 million gallons of waste.

"This tank has been an on-going source of concern for a long time and it's a big relief for all of us to finally have it emptied."

– Suzanne Dahl, Washington Department of Ecology, after most liquids and sludges were removed from tank C-106. (DOE ORP News Release, October 5, 1999).

"This alleviates one of the most hazardous problems in the tank farm and proves we can retrieve waste to send to a (treatment) plant…It's the single most complicated technological piece of work (we have) done, and we've done it practically flawlessly."

– Fran DeLozier, president of Lockheed Martin Hanford Corp. on the removal of 90,000 gallons of waste from tank SY-101. (*Tri-City Herald*, December 22, 1999).

"The burping issue has been put to rest, and the crust issue has been put to rest."

– Tony Valero, project manager for tank waste storage for the Washington Department of Ecology. (*Tri-City Herald,* December 22, 1999).

▲ *Energy Assistant Secretary Carolyn Huntoon.*

Around the DOE Complex

President Clinton nominated Carolyn Huntoon in January as DOE Assistant Secretary for Environmental Management. She was a former director of the Lyndon B. Johnson Space Center. Because of a dispute with the Senate, Huntoon was not confirmed until July.

Nuclear Regulatory Commission (NRC) officials said no major obstacles had been uncovered that would prevent the NRC from regulating DOE nuclear facilities. The NRC disputed conclusions made in 1999 by the Defense Nuclear Facilities Safety Board that external regulation of DOE facilities would be too costly or would undermine national security.

After more than a decade of legal, political and regulatory delays, the Waste Isolation Pilot Plant received its first shipment of transuranic waste in March. The waste came from Los Alamos National Laboratory.

The GAO said DOE's organization was too complicated to effectively manage all its programs, including environmental cleanup. The report said changes were needed to clear up a complex and jumbled chain of command and some of DOE's missions should be shifted to other agencies. The report said that of DOE's 80 biggest projects from 1980 through 1996, 31 were terminated before completion at a cost of $10 billion.

▲ *The first load of transuranic waste arrives at the Waste Isolation Pilot Plant in New Mexico.*

"I hope the state would use anything within its arsenal to gain some leverage, before any additional wastes hit this site, to get the necessary support for what we need out here."

– Ken Bracken, Hanford Advisory Board co-vice Chair, on DOE's preferred choice of Hanford for disposal of waste from other DOE sites. (*Tri-City Herald*, December 11, 1999).

2000

"Washington residents are hostages. Fifty-four million gallons of nasty stuff is in 177 tanks in our back yard. We get the rhetoric and the excuses. We get the song and the dance. Hanford is supposed to be cleaned up by 2046 at a grand total of $56 billion…We are hostages, but Congress writes the checks and increasingly has every reason not to be amused…Progress, on an admittedly difficult and obviously lucrative job, has been zip. What if Congress refuses to write more checks?"

– *Seattle Times* Editorial, May 17, 2000.

The Cleanup

High concentrations of tritium — 400 times higher than drinking water standards — were discovered in a monitoring well next to a Hanford burial ground adjacent to the Energy Northwest WNP-2 nuclear reactor complex. The burial ground — called 618-11 — was used from 1962 to 1967 to dispose of radioactive waste, some of which was so radioactive that it could only be handled with remote-controlled equipment. Samples taken on January 27, 2000 showed tritium levels in excess of 8 million picocuries per liter (pCi/L). Additional sampling of groundwater from 21 other wells in the area found no elevated tritium levels beyond what was found in the one well. While tritium was detected in many of the other wells, it was at levels previously documented at being below 55,000 picocuries per liter. High readings were noted

The dark shaded rectangle near the bottom center of the photo is the 618-11 burial ground. Energy Northwest's WNP-2 reactor complex is adjacent to the burial ground.

"We have been working toward this day for years. I want to express my sincere appreciation to the Department of Energy and the contractors for working so hard to make this day a reality."

– Washington Governor Gary Locke on the successful removal of the first spent fuel from Hanford's K-West basin. (DOE News Release, December 7, 2000).

"This may be the most significant accomplishment we've seen in 11 years of Hanford cleanup."

– John Savage, Director of the Oregon Office of Energy, on the successful removal of the first spent fuel from Hanford's K-West basin. (DOE News Release, December 7, 2000).

"Some people around here still want to beat a dead horse. The horse is dead… We've breathed life into it a few times, but I think it's dead, and I don't give up on things easily."

– Sam Volpentest, executive vice president of the Tri-Cities Industrial Development Council, after DOE announced its intent to permanently shut down the Fast Flux Test Facility (*Seattle Post-Intelligencer*, November 21, 2000).

in January 1999 but not immediately recognized as being of concern.

Two Hanford workers were slightly contaminated after tank waste leaked during the pumping of tank S-103 in the 200 West Area. About five gallons of highly radioactive tank waste came up through an electrical conduit and spilled onto the ground.

As expected, Hanford and the Nevada Test Site were chosen by the U.S. Department of Energy (DOE) as disposal sites for low-level and mixed low-level waste from throughout the DOE complex. DOE later agreed not to ship new waste to Hanford from other than its traditional shipping sources until after Hanford's Solid Waste Environmental Impact Statement (EIS) was issued.

The Tri-Parties agreed in June to eleven new Tri-Party Agreement milestones for the K-Basins project. Under the new schedule, sludge removal would begin in 2002 and end in 2004, about the same time that fuel removal was also scheduled to be complete. The overall completion date moved up by one year.

Hanford workers successfully removed the first spent fuel from Hanford's K-West basin in December. The nearly 300 fuel elements were taken to the Cold Vacuum Drying Facility. After about a week of drying, the fuel was then moved to the Canister Storage Building in the 200 East Area, where it would remain indefinitely.

Unless additional money was allocated for Hanford, the fiscal year 2002 cleanup budget was expected to fall $357 million short of meeting legal obligations. Hanford officials said they would fight for increased funding before the budget was officially proposed the following February.

DOE released a draft EIS in July related to the restart of the Fast Flux Test Facility (FFTF). The draft EIS indicated the FFTF could perform the missions under consideration — production of medical isotopes and plutonium 238 for space missions. However, in November, DOE announced its intent to permanently shut down FFTF and use other existing facilities.

In March, the Defense Nuclear Facilities Safety Board (DNFSB) said bulging plutonium canisters stored at Hanford's Plutonium Finishing Plant (PFP) might rupture and leak. Such an incident could contaminate workers and the storage vault, tremendously slowing efforts to convert more than four tons of scrap plutonium into a more stable form for long-term storage. Extensive cleanup was required in 1969 and 1970 after two cans leaked plutonium into the storage vault. The DNFSB said Hanford had been negligent in checking the stored cans. By July, Hanford workers had repaired 15 plutonium containers that showed potential to rupture and leak. Plutonium in the containers was either repackaged or baked into a more benign powder.

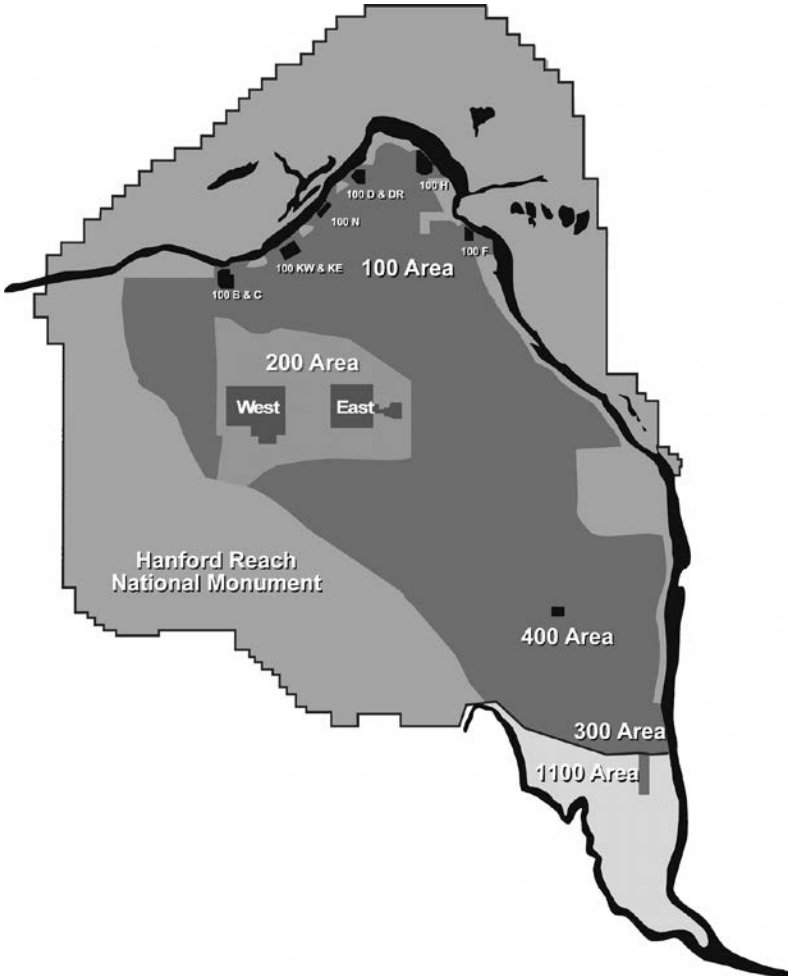
A DOE report said no hazards were imminent at the PFP that could lead to a criticality accident. Other plutonium facilities at Rocky Flats, Savannah River, Oak Ridge and Los Alamos received similar critiques. DOE had reviewed criticality safety at five of its sites following a September 1999 criticality accident in Japan which eventually killed two workers. DOE's report suggested some training and procedural changes

to further reduce the risk of a criticality accident from occurring.

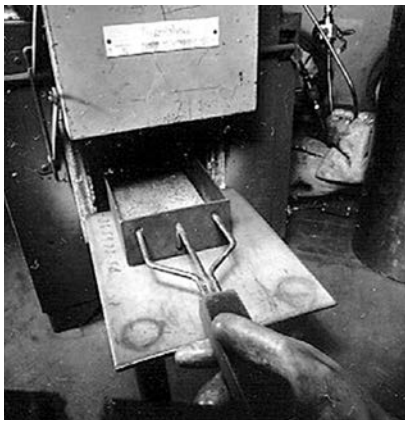
By September, major new work was underway at PFP. Hanford workers began packaging plutonium-contaminated ash from Rocky Flats. Plans were to eventually ship the ash — which did not need to be stabilized and was currently stored in 411 cans — to the Waste Isolation Pilot Plant for disposal. PFP workers also begin a new process to convert plutonium nitrate acid solutions to a stable form. Solids removed from the liquids would be thermally treated for final stabilization. And, workers began putting plutonium metals and powders into long-term storage canisters. The newer canisters were designed to prevent bulging and leaking.

Energy Secretary Bill Richardson said DOE would demand the right in future contracts to fire the contractors' top managers and control the managers' bonuses. In addition, the Energy Secretary would review decisions on what goals to set for contractors and whether the contracting companies had met those goals and should earn bonuses. DOE administered more than 30 management contracts worth more than $50 billion in the next decade.

President Bill Clinton named the Hanford Reach as a National Monument area. The Reach Monument formed a giant "C" shape around central Hanford. The monument included the Arid Lands



◀ *The Hanford Reach National Monument includes the lightly shaded areas on the left, top, and right sides of the map.*



▲ *A "boat" of plutonium-bearing materials is pulled from a furnace in the Plutonium Finishing Plant during the stabilization process.*

"These are priceless natural landscapes that have somehow remained almost untouched by exploitation, development and urban sprawl. Protection of several of these areas, in one form or another, has been discussed for years, but no action has been taken. We may not have another chance before they are lost..."

– Interior Secretary Bruce Babbitt, on national monument status for the Hanford Reach and three other areas of the country. (*Tri-City Herald*, June 1, 2000).

"In one fell swoop, this administration is destroying years of negotiations, shutting out the concerns of local people and blowing any chance of protecting the Reach in a manner that accommodates the needs of all parties."

– Washington Senator Slade Gorton, on designation of the Hanford Reach as a national monument. (*Tri-City Herald,* June 1, 2000).

▲ ***Fire scorched much of the Hanford Site. Fire barriers sucessfully kept the fire from Hanford facilities.***

"If the fire had gone beyond where it did, there was the potential for more serious consequences."

– Keith Klein, DOE-Richland Manager. (*Tri-City Herald*, July 3, 2000).

"I'm very confident there are not going to be health problems. Even if we missed something so far, it'll be below the limits for health risks."

– Debra McBaugh, Washington Department of Health, after it was discovered that some radioactive materials were released to the air during the Hanford fire. (*Tri-City Herald,* July 13, 2000).

Ecology Reserve, the Saddle Mountain National Wildlife Refuge and areas along the Columbia River north of Richland. Clinton also directed that "objects of scientific and historic interest" on the rest of the Hanford Site be protected. This could result in eventually adding lands to the monument as Hanford was cleaned up.

DOE notified the Washington Department of Ecology and the Environmental Protection Agency (EPA) in June that it was in substantial danger of failing to meet 21 Tri-Party Agreement milestones. Many of the milestones were not due for several years. One of the milestones was not due to be completed until September 2018.

A huge range fire burned 192,000 acres on and near the Hanford Site. The fire scorched one crib and two dried up waste ponds, threatened nuclear facilities in the 200 West Area, and also threatened FFTF and the HAMMER training facility. About 45 percent of the Hanford Site burned, including nearly all of the Arid Lands Ecology Reserve. About 20 homes were destroyed in Benton City. Seven thousand people were evacuated at one time from Benton City and West Richland. High winds and nearly 100 degree temperatures hampered firefighting efforts. More than 800 firefighters from throughout the Northwest battled the fire.

Initial surveys found no radioactive contamination spread from the fire, but within a few weeks, air samples taken in Richland and Pasco detected plutonium 100 to 1,000 times higher than normal background, but still well below state and federal safety standards. EPA officials said the readings were similar to those when nuclear weapons tests were routinely conducted in the atmosphere and posed no risk to human health.

An EPA audit said delays in cleaning up Hanford's underground storage tanks greatly increased environmental risks. The internal audit, by EPA's Regional Inspector General, said cleanup delays significantly increased the risk of leaks from the tanks into groundwater or air. The report criticized cleanup regulators — the EPA and Ecology — for failing to enforce cleanup deadlines.

Hanford finally made its first shipment of transuranic waste to the Waste Isolation Pilot Plant in New Mexico. Because of continuing unresolved issues with the State of New Mexico related to properly documenting the origins and contents of the waste, the shipment contained just seven drums of waste. A full load was 42 drums.

DOE shipped 667 metric tons of surplus uranium from Hanford to its Portsmouth Site in Ohio. The uranium had been stored in the 200 Area and was declared surplus.

DOE and Bechtel began a soil cleanup project at N Reactor. The cleanup would involve removing nearly 150,000 tons of contaminated soil and debris from cribs and trenches.

DOE, EPA and Ecology signed an agreement for the clean up of contaminated soil, structures and debris from 45 burial grounds in Hanford's 100 Area. The estimated $400 million cleanup would take about 10 years to complete. Materials excavated from the burial grounds would be disposed in Hanford's Environmental Restoration Disposal Facility.

EPA reduced the largest fine in Hanford's history. A $367,078 fine levied in February 1999 against DOE and its contractors was reduced to $25,000 and about $90,000 in extra cleanup work. The fine originally related to violations with Hanford's chemical storage practices.

The Hanford Advisory Board selected Todd Martin to replace Merilyn Reeves as Chair. Martin, an environmental consultant, was a former researcher for the Hanford Education Action League.

Fluor Hanford's contract to manage a major part of Hanford cleanup was extended for six years and $3.8 billion. The contract included incentives for Fluor to earn up to $168 million in profits. Fluor had been the primary contractor at Hanford since October 1996.

"It has only been 13 years since the N Reactor was permanently shut down. This short period of inactivity resulted in radioactivity levels up to 50 times higher than at other soil cleanup sites."

– Rick Donahoe, project lead for Bechtel Hanford, as soil cleanup began at N Reactor. (DOE News Release, August 8, 2000).

◄ ***Soil cleanup work near the N Reactor.***

"It's time to end the debate and focus our attention on getting the cleanup done."

– Tom Fitzsimmons, Ecology Department Director, about the issuance of a "final determination" – setting milestones and enforcement policies for the construction and operation of tank waste treatment facilities. (Ecology News Release, March 29, 2000).

"It is disappointing to say the least that DOE has failed to move forward in the retrieval of wastes from its failing (single-shell tanks), to construct and operate a tank waste treatment complex, or to otherwise comply with federal and state hazardous waste law as they pertain to DOE's Hanford site tank wastes. DOE has…repeatedly changed course…and continues to argue for…terms which would not hold it accountable to comply with the law."

– From Ecology's Final Determination. (March 29, 2000).

"Without a complete and integrated planning, budgeting and management approach to the tank waste remediation project, the Department may be unable to control, predict, explain or defend future changes to cost and schedule."

– DOE Inspector General Report on Hanford's tank waste treatment program. (DOE/IG-0456 January 2000).

"(The Inspector General's Office) forgot to say that management here already knows this and is doing something about it."

– Dick French, Manager of DOE's Office of River Protection. (*Tri-City Herald,* February 12, 2000).

Tank Waste Treatment

Enforcement action by the State of Washington to set a schedule to construct and operate Hanford's tank waste treatment facilities was ultimately overcome by the collapse of DOE's privatization efforts.

Ecology Director Tom Fitzsimmons issued a "final determination" — setting milestones and enforcement policies for the construction and operation of tank waste treatment facilities. Fitzsimmons' action came after more than 18 months of negotiations failed to reach a cleanup schedule that both the state and DOE could agree on. The biggest disagreement was related to enforcement of the Tri-Party Agreement. The state wanted to be able to take enforcement action as soon as it became clear a milestone could not be met, rather than having to wait for the milestone to actually be missed. This was especially important in the tank waste project when milestones for construction were several years apart. Both sides agreed on the basic schedule: DOE would sign a contract with BNFL by August 31, 2000; construction would begin by July 31, 2001; operational testing of the pre-treatment and vitrification facilities would begin by December 2007; commercial production of the facilities would begin by December 2009; and 10 per cent of the tank waste would be treated by December 2018. Fitzsimmons also issued a final determination related to inventorying Hanford's hazardous and mixed wastes and development of a plan for treating and disposing all wastes not currently covered under the Tri-Party Agreement.

A DOE Inspector General's Office report said Hanford's tank waste treatment program needed better long-range planning and coordination. Hanford officials said they identified those problems some time ago and were working to address them. The report showed significant improvements since a previous review in 1993 but did list several concerns. Among those were BNFL's ability to complete 30 per cent design of the treatment facilities by August; what it called an "unrealistic" deadline of 2028 to treat all of Hanford's tank waste; and a lack of available tank space.

Hanford tank farm workers. ►

The Washington Legislature passed a bill to exempt Hanford's tank waste treatment facilities from local property taxes. The bill was expected to save about $1 billion from the cost of the project. The property tax exemption would not take effect until 2006, allowing local jurisdictions to collect taxes in 2003, 2004 and 2005. Those taxes would be used to help pay for increased services the project would demand. Washington Governor Gary Locke signed the bill into law.

In April, BNFL submitted its formal cost estimate to begin treatment and vitrification of Hanford's tank waste — an estimate they had been working on since 1998. BNFL admitted the price of $15.2 billion — based on 100 per cent private financing — was likely not affordable. BNFL officials said they were confident the construction and operating costs would be about $6 billion but the cost of financing would greatly increase the overall cost.

Energy Secretary Richardson immediately said the price was unacceptably high and not fundable and that DOE would not approve BNFL's proposal. In May, after further evaluation by DOE on available options, Secretary Richardson announced he would terminate the BNFL privatization contract. DOE would seek new bidders and award a new contract by the end of the year to complete the design work and construct the facilities.

DOE Deputy Secretary T. J. Glauthier said BNFL's design work appeared sound and BNFL's partner, Bechtel, would continue design work through mid-December. Dick French, Manager of DOE's Office of River Protection (DOE-ORP), said the new company could submit its own design or continue with BNFL and Bechtel's design. Glauthier said the privatization approach — under which BNFL was to pay all upfront costs and be repaid only when glass was produced — would be totally or partly eliminated.

Secretary Richardson met with Washington Governor Gary Locke and Attorney General Christine Gregoire in an attempt to keep Hanford's tank waste vitrification program moving forward. Richardson agreed to immediately amend the consent decree to require DOE to meet milestones to replace BNFL. Under the agreement DOE agreed to award a new contract by January 15, 2001.

By June, DOE-ORP issued a notice to terminate its privatization contract with BNFL Inc. At the same time, DOE-ORP modified its contract with CH2M Hill Hanford Group to add vitrification plant design work and operations to its current scope of work. DOE-ORP decided against issuing a "bridge" contract to Bechtel to continue the design until the new contract was awarded, after other potential bidders complained that Bechtel would have an unfair advantage in bidding.

DOE-ORP made its "Government Fair Cost Estimate" for tank waste treatment publicly available. The government estimate to design, construct and operate tank waste treatment facilities totaled $9.512 billion, as opposed to BNFL's estimate of $15.2 billion. The "hard-cost" estimates for design, construction and operation of the treatment facilities (along with a contingency), was $3.653 billion. Private financing was

"We seriously underestimated the costs. It was the best (estimate) we had, but we were wrong…We've got enough information now to know that this is a price that DOE cannot afford."

– Mike Lawrence, General Manager, BNFL Hanford, on the doubling of BNFL's cost estimates for treating Hanford's tank wastes. (*Tri-City Herald*, April 12, 2000).

"Doing it at the (original) numbers we have now is pretty heavy lifting. Doing it at these new numbers is impossible."

– Dick French, Manager of DOE's Office of River Protection. (*Seattle Post-Intelligencer,* April 13, 2000).

"Few people now believe this is the right way to finance this job. Under the present scheme, the cost of private capital is contributing about half of this total. The biggest opportunity (to reduce costs) is to reexamine how we can reduce the financing burden, while retaining the benefits of the privatization approach."

– Paul Miskimin, President and Chief Executive Officer of BNFL Inc. (BNFL Inc. News Release, April 24, 2000).

"BNFL's proposal was outrageously expensive and inadequate in many ways. We will start competition for a new contract right away…and conduct business so we should be able to meet our long term schedules for operating a waste treatment plant."

– Energy Secretary Bill Richardson. (DOE News Release, May 8, 2000).

"While disappointed that the Department of Energy has decided to re-compete the entirety of the contract, we are pleased that they have determined that the design and technical solution is sound."

– (BNFL News Release, May 8, 2000).

▲ *Dick French*

"I'm very, very disappointed. We found Dick to be an exceptionally open and honest person. We don't know anyone else who is working for this program (very hard) in Washington, D.C."

– Dan Silver, Deputy Director, Washington Department of Ecology. (*Tri-City Herald,* July 29, 2000).

"The Department of Energy has taken a difficult situation and made it much worse with Dick French's removal…top DOE officials' insistence on micro-managing the Hanford Waste Vitrification Project from 3,000 miles away has placed the project…in serious jeopardy. A better tack would be for… the Energy Department's Office of Environmental Management to get out of French's way and stop flouting the will of Congress and the ORP legislation."

– *Tri-City Herald* Editorial. (July 31, 2000).

estimated to add another $5.859 billion. The estimate was for treating about 10 per cent of Hanford's tank waste by 2018.

In July, DOE paid BNFL $100 million as partial payment for its design work. DOE paid BNFL another $100 million at the end of August. The amount of a third payment was negotiated later.

French was removed as Manager of DOE-ORP over disagreements with DOE Headquarters on issues related to authority over the program. Harry Boston, DOE Richland's Deputy Manager for Site Transition, was named Acting Manager of DOE-ORP.

In August, DOE released its final request for proposals to design, build and test tank waste treatment facilities. The proposal would delay the scheduled start of construction by about a year — to mid-2002 — but maintain the "hot start" date of 2007.

Two corporate teams submitted bids in October. One team was led by Bechtel National and Washington Group International, which had absorbed two major construction corporations in recent years — Morrison Knudsen Corp. and Raytheon Engineers and Constructors. The other included Fluor Corp., Cogema and Foster Wheeler Corp.

In December, DOE awarded a ten year, $4 billion contract to the consortium of Bechtel National and Washington Group International. The contract called for facilities to be constructed and tested by 2007 with full operations by 2011. Bechtel-Washington expected to fully take over the design work from CH2M-Hill Hanford Group by April.

Tank Safety

Ecology notified DOE-ORP that it was not satisfied with the pace of the single-shell tank waste retrieval program. Ecology said the program was under-funded and DOE had not pursued retrieval technology development with sufficient vigor.

Hanford workers completed the final waste transfer from tank SY-101 in March. About 286,000 gallons of waste was pumped from the tank in the transfer and more than half a million gallons overall. The pumping was done to resolve flammable gas hazards and growth of the tank's crust.

Hanford workers also completed pumping of liquids from tanks T-104 and T-110. All liquid waste in the 40 tanks in the T, TY and TX tank farms in the northern 200 West Area had been pumped. Half of the tanks were suspected leakers.

Ecology levied a $200,000 fine against DOE for failing to complete assessments of Hanford's double-shell tanks. The Tri-Party Agreement required DOE to complete an integrity assessment by September 30, 1999 to determine the structural condition of the tanks. Ecology determined that DOE did not perform all the planned assessments. Ecology officials said while there was no indication that any double-shell tank currently was leaking, a full integrity assessment was vital to ensure successful cleanup of tank wastes. DOE officials said some

of the assessments were deferred to focus resources on resolving safety issues associated with tanks C-106 and SY-101. In addition to the fine, DOE was ordered to completely examine the entire double-shell tank system by March 2006.

Hanford workers took samples from beneath tank SX-108, following the drilling of a slant well beneath the tank. The tank was assumed to leak in 1962. The samples would help determine risks caused by contaminants in the vadose zone.

DOE removed two Hanford tanks from the Wyden Watch List. Tanks C-102 and C-103 were placed on the Watch List in 1990 because of concerns that a floating layer of organic material similar to kerosene could ignite and release radioactivity into the environment. Subsequent sampling and analysis determined the likelihood for that to occur was extremely unlikely. Twenty five tanks remained on the Watch List.

Around the DOE Complex

A new DNFSB report said work at Hanford and other DOE sites did "not reflect the urgency that the circumstances merit." The report addressed recommendations made in 1994 for cleaning up plutonium. The DNFSB acknowledged some progress, but said severe problems — especially funding — continued to impede cleanup. The report to Energy Secretary Richardson suggested he advise Congress and the President of the funding problems, then prioritize tasks according to potential safety risks. The Savannah River Site was listed as having the three most urgent problems, followed by concerns over converting plutonium solutions into stable forms both at Savannah River and at Hanford's Plutonium Finishing Plant.

Updated costs to clean up DOE's nuclear weapons complex rose 44 percent since an estimate two years earlier. DOE estimated it would need $151 billion to $195 billion through 2070. Seventeen of the 113 sites nationwide would take as much as a decade longer to clean up while DOE hoped to finish work at five sites more quickly than earlier forecast. Cost estimates for the Hanford cleanup rose slightly from a 1998 estimate of $54.8 billion to a new estimate of $55.6 billion. The estimated end of the cleanup in 2046 was unchanged.

DOE officials met with British investigators to explore BNFL's problems associated with falsifying documents related to the production of plutonium fuel. In addition to its work at Hanford, BNFL was also involved with nuclear waste cleanup at several other DOE sites. A coalition of watchdog groups asked Secretary Richardson to bar BNFL from any government contracts, including a contract to vitrify Hanford's tank wastes.

A June General Accounting Office (GAO) report said DOE had so far been unsuccessful with its attempts at privatizing some of its cleanup work. The GAO reviewed three DOE privatization projects — the tank waste treatment program at Hanford and two projects at the Idaho

"Considering the importance of the double-shell tank system, we were particularly disappointed with the poor effort by the DOE to ensure the system will remain fit for use."

– Bob Wilson, Ecology Senior Compliance Inspector. (Ecology News Release, April 5, 2000).

"…no samples have ever been taken from a region most impacted by a tank leak…We want to know where the contaminants are now, where they are going, and how fast they are moving."

– Rick Raymond, Acting Project Manager for the single-shell tank interim closure project. (Hanford Reach, June 26, 2000).

"The issue is they'd like to see us do it faster. We concur. We'd like to see it done faster, too."

– Harry Boston, DOE's deputy manager for site transition at Hanford, commenting on a critical DNFSB report. (*Tri-City Herald*, January 25, 2000).

"We are now placing BNFL under extra scrutiny because of these problems... Business as usual is over with BNFL and with all our contractors, but especially with BNFL."

– Energy Secretary Bill Richardson. (*New York Times*, March 22, 2000).

"The fear is that this is a company that only cares about dollars and doesn't care about how it gets there. I think it is a character issue and an ethics issue."

– Tom Carpenter, Government Accountability Project, on BNFL. (*Tri-City Herald*, March 23, 2000).

"If (these additional reviews) help ease DOE's concerns as to our technical and operational capabilities, and move us beyond the misinformation campaigns of the special interest groups, it will be a positive step in finally moving these major projects to actually cleaning up the legacy wastes of the Cold War."

– (BNFL News Release, March 23, 2000).

"The government is done fighting workers, and now we're going to help them. We're reversing the decades-old practice of opposing worker claims and moving forward to do the right thing."

– Energy Secretary Bill Richardson. (*The New York Times*, April 12, 2000).

"No amount of compensation will bring my dad back. But this may be able to help some other people who are sick — who are going through what we went through."

– Jim Williamson of Kennewick, whose father, Jack – a Hanford worker – died about six months earlier. (*Tri-City Herald*, April 12, 2000).

"We haven't made thousands and thousands of people sick. But there are hundreds, and we are opening the door wider to make sure we get everyone."

– David Michaels, DOE Assistant Secretary for Environment, Safety and Health. (*Tri-City Herald,* April 13, 2000).

National Engineering and Environmental Laboratory. The GAO found common problems at all three projects, including unrealistic schedules and wastes not thoroughly studied.

For the fourth consecutive year, Energy Secretary Richardson and Secretary of Defense William Cohen certified to the President that the nation did not need to resume nuclear tests to maintain the safety, security and reliability of America's nuclear weapons stockpile. It had been almost eight years since the last U.S. underground nuclear test.

A National Academy of Sciences study said more than two thirds of the DOE nuclear weapon production sites — including Hanford — would never be completely cleaned of contamination and would require long-term monitoring.

After decades of denials, the federal government conceded that workers in America's nuclear weapons production facilities were exposed to radiation and chemicals that caused cancer and early death. A report prepared by DOE and the White House concluded radiation exposure led to higher-than-normal rates of a wide range of cancers among workers at 14 nuclear weapons plants, including Hanford. President Clinton signed legislation in October to provide the first widespread compensation to nuclear workers harmed by exposure to radiation and hazardous chemicals.

A House Commerce Committee report said DOE had wasted much of the $3.4 billion it had spent on developing new technology to clean up Hanford and other nuclear weapon production sites. The report said hundreds of millions of dollars had been "squandered" on technologies that had not proved useful. The report further stated that of the nearly 1,000 new technologies developed, only a few had been put to use.

"…it is simply beyond reason to ask EPA and Ecology to accept an arrangement under which the regulatory agencies will be forced to watch and wait, with no real ability to assess real-time progress, until some distant milestone is missed before they can take action…"

– Letter from Chuck Clarke, U.S. Environmental Protection Agency Regional Administrator, to Ecology Director Tom Fitzsimmons, indicating EPA's willingness to join Ecology in issuing a final dispute determination on Tri-Party Agreement milestones for the tank waste project. (February 3, 2000).

2001

"We are skeptical that management reforms, innovative technologies, and streamlined regulation are a panacea that will make up for substantial budget cuts and keep DOE's cleanup program on track… Requesting extensions to milestones in cleanup agreements to accommodate spending priorities does not constitute management reform, and we oppose such requests."

– Letter from 10 Attorneys General – including Christine Gregoire of Washington and Hardy Myers of Oregon – to Energy Secretary Spencer Abraham regarding proposed budget cuts from the Bush Administration. (June 12, 2001).

The Cleanup

A battle was waged through much of the year to force the new Bush Administration to provide sufficient funding to Hanford for the U.S. Department of Energy (DOE) to meet cleanup schedules.

Early indications had been that the proposed Bush budget for fiscal year 2002 would be inadequate yet it was still a shock when the proposed budget came in at about $400 million less than Hanford officials had requested. Funding for DOE's Office of River Protection (DOE-ORP) was slated to increase slightly — but not nearly as much as had been requested. The budget for DOE's Richland Operations Office would be cut by more than $100 million — when Richland managers were hoping for a slight increase from fiscal year 2001 funding levels. Washington state officials said if the funding levels remained as proposed they would have no choice but to go to court.

"We respectfully request that you demonstrate your unequivocal support for cleaning up Hanford within the agreed to timelines by requesting and advocating the appropriate level of funding that is needed."

– Letter to President George Bush from Washington Governor Gary Locke and Attorney General Christine Gregoire. (March 14, 2001).

"This budget sets a sensible course by clearly fulfilling commitments and establishing key priorities, but at the same time signals our intention to rethink a host of programs while we craft the Bush Administration's policy."

– Energy Secretary Spencer Abraham. (DOE News Release, April 9, 2001).

"If approved, this budget could leave the state with no choice but to engage in lengthy and expensive litigation over DOE's missed cleanup deadlines."

– Washington Attorney General Christine Gregoire. (Washington Attorney General News Release, April 9, 2001).

◀ ***Inside Hanford's Radiochemical Building, 1956.***

"In my judgment, a billion more dollars isn't going to do much more because... most of the (DOE cleanup) sites don't have a short-term game plan. They've got some milestones in some places but not ones that are going to bring about cleanup in a short time frame."

– Energy Secretary Spencer Abraham. (*Tri-City Herald,* May 11, 2001).

"Ecology will not accept the wholesale dismantlement of projects that in many cases have been established through years of thoughtful and responsible development."

– Letter from Ecology Hanford Program Manager Mike Wilson to DOE-Richland Manager Keith Klein and DOE-ORP Manager Harry Boston. (May 14, 2001).

"Setting the budget for Hanford without considering the goals and required actions for cleanup is shortsighted. It will make future cleanup measures more complicated and more expensive. Ultimately, there will be no budget gain from sacrificing progress on the cleanup at Hanford."

– Letter from Oregon Governor John Kitzhaber to President George Bush. (May 28, 2001).

"Congress' support for full cleanup funding has prevailed, and the federal government's legal, contractual and moral cleanup obligations will be met at Hanford."

– Representative Doc Hastings of Washington. (*Tri-City Herald,* November 14, 2001).

The new Energy Secretary, former Michigan Senator Spencer Abraham, refused to endorse additional funding for DOE or other sites. Despite questioning from two Northwest senators — Maria Cantwell from Washington and Larry Craig from Idaho, Abraham told a Senate Committee that DOE did not need additional funding for fiscal year 2002.

In a letter to DOE, Washington Department of Ecology officials said Hanford's proposed fiscal year 2002 budget was unacceptable. Ecology officials said they could not accept delays in the single-shell tank waste retrieval program or delays in the construction and hot commissioning of tank waste treatment facilities. The letter also raised concerns about cutbacks in tank farm upgrades, vadose zone characterization and groundwater monitoring programs, and cleanup work along the Columbia River.

President George Bush's nominee to head DOE's environmental cleanup program told a Senate committee that hard decisions needed to be made and she was not satisfied with "70 year schedules and mind-boggling budgets." Jesse Roberson, the former manager of the Rocky Flats Site in Colorado, was confirmed by the Senate in July.

Over the course of the summer and fall Congress restored funding to the budget — giving Hanford cleanup about $1.8 billion for fiscal year 2002.

Before leaving office, Energy Secretary Bill Richardson signed a Record of Decision ordering the permanent closure of the Fast Flux Test Facility (FFTF). Before that action could be implemented, Washington Congressman Doc Hastings succeeded in getting new Energy Secretary Abraham to suspend the order while DOE looked one more time at potential missions for the reactor. The review explored potential partnerships to cover the costs of operating the reactor. During that period Advanced Nuclear and Medical Systems of Richland proposed to lease the reactor for 35 years for the production of medical isotopes. Organized labor would provide the financing. DOE would be asked to pay for stand-by costs for the coming three years. DOE determined that proposal failed to specifically identify markets and failed to demonstrate adequate financing. In December, Energy Secretary Abraham ordered the permanent shutdown of FFTF.

DOE shipped 258 tons of surplus uranium billets from the 300 Area to a DOE facility in Portsmouth, Ohio. Billets were heavy 20-inch-long cylinders that held uranium. Smaller amounts of uranium pellets were also shipped to Portsmouth and some uranium shipped to Sandia National Laboratory for research. Additional uranium — nearly 150 tons — was buried in Hanford's disposal trenches. The uranium was originally intended for use in Hanford's plutonium production reactors. It had been stored at Hanford since the reactors were closed.

Washington's Pollution Control Board said the Department of Ecology could enforce Tri-Party Agreement milestones as soon as they appeared to be in jeopardy — rather than having to wait until a milestone was actually missed. DOE and Ecology strongly disagreed in recent years over when Ecology could take enforcement action. After

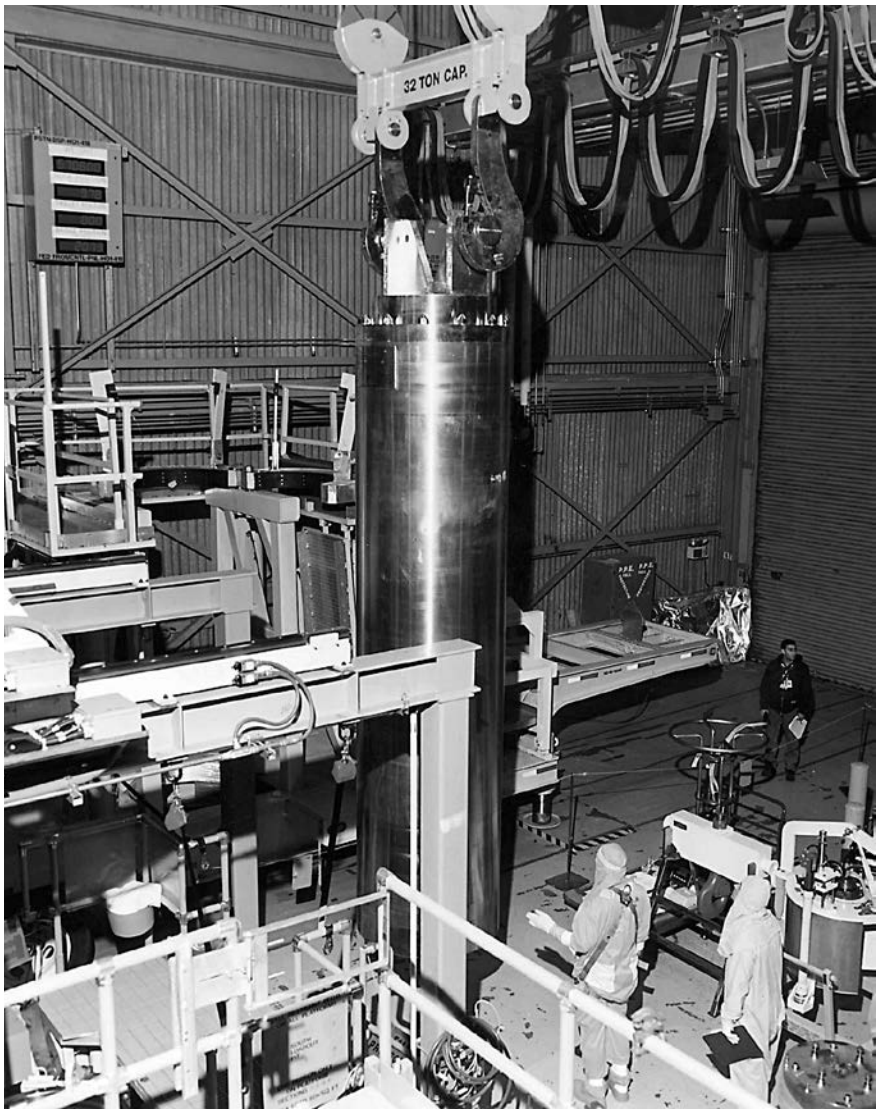
unsuccessful negotiations on new milestones for tank waste treatment Ecology Director Tom Fitzsimmons imposed milestones and the enforcement issue in March 2000 as the Tri-Party Agreement allowed. DOE appealed and the issue was heard by the Pollution Control Hearings Board.

Ecology levied a $57,800 fine against DOE and Fluor Hanford for failing to properly identify and manage a reactive chemical waste stored at a Hanford laboratory. A container of the chemical Collodion was detonated by the Richland bomb squad after it was discovered at a Hanford laboratory in January. A subsequent search found additional quantities of the chemical which were not properly labeled.

Fluor-Hanford added a second shift at the K-West basin to continue the progress of removing spent nuclear fuel from the basin to be dried, packaged, and moved to the central part of the site for long-term storage. Fluor also decided that once the K-West basin was empty of fuel, corroding fuel from the K-East basin would be moved into the K-West basin before it too was removed for drying and packaging. That

"We've been here before, and we're disappointed to keep seeing the same problems."

– Bob Wilson, Ecology inspector, on problems with properly labeling chemicals. (Department of Ecology News Release, March 26, 2001).



◄ *A canister containing spent nuclear fuel is moved in one of the K-Basins.*

would avoid having to duplicate the elaborate fuel-loading and sorting equipment already in the K-West basin. Fluor officials hoped that process would help them meet schedules for removing fuel from both basins.

A DOE Inspector General Report said DOE was not making good use of its available low-level waste disposal facilities at Hanford and the Nevada Test Site. The audit showed that during the past two years the Nevada and Hanford disposal facilities operated at less than 50 percent of capacity, yet DOE continued to store large amounts of waste at generator sites and disposed of some low-level waste at commercial facilities.

Improperly calibrated equipment apparently resulted in some transuranic waste being buried in Hanford's Environmental Restoration Disposal Facility. Transuranic waste was supposed to be disposed in the Waste Isolation Pilot Plant — a deep geologic repository in New Mexico. The problem went unnoticed for two years.

Hanford workers completed removal of contaminated debris and equipment from B Cell, which contained nearly three million curies of radioactivity. Because of the high radiation levels in the area, remote-control devices were used in the cleanup. B Cell was located in Hanford's 300 area.

DOE, the U.S. Environmental Protection Agency (EPA) and Ecology signed the final Record of Decision (ROD) for the 300 Area at Hanford. The ROD outlined how DOE and its contractors would remove contaminated soil, structures, and associated debris from 47 waste sites and nine burial grounds — including the 618-10 and 618-11 burial grounds north of the 300 Area.

"How we can go for two years and not detect this analytical problem? The analytical work is sloppy at best."

– Doug Sherwood, U.S. Environmental Protection Agency. (*Tri-City Herald,* July 25, 2001).

Waste being dumped into a 300 Area burial ground in 1955. ▼

▲ *Left photo: A reactor compartment from a nuclear-powered cruiser on the Columbia River. Right photo: Submarine and cruiser reactor compartments in a trench at Hanford.*

The 100th naval nuclear reactor compartment was sent from Puget Sound Naval Shipyard to Hanford for disposal.

A National Academy of Sciences Committee concluded that the "knowledge and technology to address the most difficult problems (at Hanford) do not yet exist." The Committee had some praise for work underway or completed at Hanford, including the science and technology work of the Groundwater/Vadose Zone Integration Project. The Committee's report said cleanup timelines were driven by government regulations rather than by scientific needs. The Committee was also sharply critical of the lack of funding dedicated to science and technology development.

Security at Hanford was increased following the terrorist attacks on the World Trade Center and Pentagon.

DOE Headquarters ordered a reduction in the number of DOE employees. That resulted in the loss of about 10 percent of federal employees at both DOE's Richland Field Office and DOE-ORP. The Richland office's target was 339 positions. It had 366 federal employees. DOE-ORP was supposed to cut from 130 employees to 109, even though it had been in the process of expanding its federal workforce to 150, to help manage the tank waste vitrification program.

Energy Secretary Abraham made his first visit to Hanford in November. During a brief, few hours in the Tri-Cities, he met with federal employees, toured FFTF, announced an extension of Battelle's contract to manage Pacific Northwest National Laboratory, and briefly visited a tank farm.

"The Hanford cleanup program appears to operate on the philosophy that it is better to take a step in approximately the right direction than to know exactly where it is going."

– National Academy of Sciences Report. (*The Oregonian*, August 3, 2001).

▲ *Energy Secretary Spencer Abraham (on left) at Pacific Northwest National Laboratory.*

Tank Waste Treatment

DOE extended CH2M Hill Hanford Group's contract at Hanford. CH2M Hill managed Hanford's tank farms and was responsible for ensuring waste was ready for retrieval from the tanks once vitrification facilities were operational. The five year contract extension was worth $2.2 billion.

Construction of Hanford's TX Tank Farm, 1948. ►

Washington Group International — a subcontractor for Hanford's tank waste treatment facilities — filed for Chapter 11 bankruptcy. Washington Group was the primary subcontractor for Bechtel National, which was responsible for the design, construction, and initial operation of Hanford's tank waste vitrification facilities. DOE and Bechtel officials said the financial problems faced by Washington Group should not impact the Hanford project.

Ecology officials rejected DOE's request to delay some Tri-Party Agreement milestones related to the construction and operation of vitrification facilities and announced its intent to levy a weekly fine against DOE if it missed a July 31 deadline to begin construction on tank waste treatment facilities. Fines would be assessed beginning August 1 and would continue until construction began or until DOE submitted an acceptable plan demonstrating how the treatment facilities would be operational beginning in 2007. Under the Tri-Party Agreement, the state could fine DOE up to $5,000 for the first week after a missed deadline and up to $10,000 for each subsequent week until the problem was fixed. DOE-ORP formally appealed Ecology's action.

DOE-ORP meanwhile began work on a "recovery plan" to explain how it would begin operation of waste treatment facilities by 2007 even though the start of construction had been delayed by more than a year. Ecology Director Fitzsimmons said that unless Congress and the Administration provided sufficient funding to move forward with construction, any recovery plan was meaningless.

DOE-ORP Manager Harry Boston said in November that DOE was exploring alternatives to vitrifying all of Hanford's tank waste in hopes of saving tens of billions of dollars and completing the cleanup decades ahead of schedule. Boston said the initial vitrification plant

"DOE's proposals are evidently based on the incorrect assumption that changes made unilaterally by DOE to contract terms and baselines justify modifying the (Tri-Party Agreement). DOE is required to manage its contract terms and baselines to ensure compliance with the schedule contained in the (Tri-Party Agreement), not vice versa."

– Letter from Ecology Hanford Program Manager Mike Wilson to James Rasmussen, DOE-ORP. (May 16, 2001).

"Our focus is on action and results, and that's the message we are sending with the fines."

– Ecology Director Tom Fitzsimmons. (Ecology News Release, July 26, 2001.)

"Our lawyers are sharpening every sword and every arrow in their quivers."

– Ecology Director Tom Fitzsimmons. (*Tri-City Herald,* September 7, 2001).

▲ ***DOE-ORP Manager Harry Boston.***

"The technology you use should be tailored to the problem. (If there are ways to more cheaply handle the waste while protecting the environment and people), shouldn't we talk about it?"

– DOE-ORP Manager Harry Boston, at a meeting of the Hanford Advisory Board. (*Seattle Post-Intelligencer,* November 7, 2001).

would likely be able to treat much more waste than was originally envisioned, possibly eliminating the need for an additional, larger plant to complete the work. Boston said increasing ORP's annual budget from about $1 billion to the $3 to $4 billion needed to construct and operate a second vitrification facility was simply not doable. Boston said many of Hanford's tanks held very little liquid waste and perhaps could be left in place.

A November 19 memo from Energy Assistant Secretary Roberson to DOE's budget office outlined nine priorities to reduce the time and cut the cost of cleanup, including not vitrifying 75 percent of DOE's high-level liquid waste. The memo suggested DOE needed to develop at least two proven cost-effective solutions to vitrification.

Congress approved extending the Office of River Protection as a separate entity to 2010.

Tank Safety

Tank SY-101 was removed from the Wyden Watch List in February. Once the top safety problem in the DOE complex because of periodic releases of hydrogen gas, the tank was returned to service in September and available to take waste from other tanks. More than half a million gallons of waste was pumped out of the tank in 1999 and 2000 and water was added to dilute the remaining waste. This dissolved nearly all the gas-retaining solids in the tank.

In August, DOE removed the final 24 tanks from the Wyden Watch List — nearly eleven years after its creation. Sixty of Hanford's 177 underground tanks were on the list at one time or another — many

"We would really like to see what the technology can do, before we say what it can't do."

– Suzanne Dahl, Ecology, on DOE-ORP suggestions that some of Hanford's tank wastes might not be vitrified. (*Seattle Post-Intelligencer,* November 7, 2001).

"That memo is one of the most troubling things we've seen in a long time."

– Mike Wilson, Manager, Washington Department of Ecology Nuclear Waste Program. (*Tri-City Herald*, December 7, 2001).

"For nearly two decades, the federal government has promised the residents of Oregon and Washington a treatment plant that would convert the high-level waste into a more stable glass form. Twice during the Clinton Administration, the project failed to even begin. Like my constituents, I am hopeful that the new team (at DOE) will be able to live up to this promise."

– Letter from Oregon Senator Gordon Smith to Office of Management and Budget Director Mitch Daniels. (November 29, 2001).

A Hanford tank farm. ▼

"A decade ago, I responded to the dangerous threat posed by certain nuclear waste storage tanks at Hanford by passing a law to protect the people of the Northwest from possible radioactive tank explosions. Today, I'm proud to see the watch list become extinct."

– Oregon Senator Ron Wyden. (DOE-ORP News Release, August 17, 2001).

"Our employees have worked hard to improve the conditions in these tanks, not only to remove them from the watch list, but also to make them available for normal operations."

– Fran DeLozier, President and General Manager of CH2M Hill Hanford Group. (DOE-ORP News Release, August 17, 2001).

for more than one safety-related issue. The removal of all tanks from the Watch List beat a Tri-Party Agreement milestone which required that to happen by September 30.

Around the DOE Complex

A watchdog group said DOE sites were vulnerable to terrorist attacks. The Project on Government Oversight said mock terrorist attacks on DOE facilities over the past several years had succeeded more than half the time. The eight month study was based on unclassified documents and information from more than a dozen whistleblowers. Although DOE officials said security at all DOE sites had been tightened since the September 11 terrorist attacks, a spokesman for the Project said the sites were still vulnerable. According to the report, mock terrorists, including Navy SEAL commandos, were successful in stealing plutonium and other nuclear materials from Rocky Flats in Colorado and at Los Alamos in New Mexico. The study made no specific reference to Hanford. The study recommended consolidating all nuclear materials at a few sites and creating an independent agency outside of DOE to handle security.

The Energy Employees Occupational Illness Compensation Program Act took effect, providing money to nuclear workers who may had gotten cancer or other diseases as a result of on-the-job exposure to radiation or hazardous chemicals. An office opened in Kennewick to handle claims by Hanford workers, retired workers and their survivors.

A General Accounting Office report recommended DOE look at restructuring itself and shift some missions to other agencies or farm out more responsibilities to private companies. The report said DOE had trouble handling its unrelated missions and that its managerial shortcomings resulted in cost overruns and delays.

"The challenge of this program is great, but it does not mean taking three generations to see results. I do not want to leave this for my daughter's children to figure out. We can and we must do better."

– Jesse Roberson, Nominee for Energy Assistant Secretary for Environmental Management. (*Tri-City Herald*, May 17, 2001).

2002

"We will do everything necessary to protect Washington state's interests. We sued the Clinton administration. We will sue the Bush administration. It's not partisan. We've seen too many delays."

– Washington Governor Gary Locke, on concerns about inadequate Hanford cleanup funding. *(Tri-City Herald*, February 27, 2002).

The Cleanup

The Bush Administration again proposed significant cuts in the Hanford cleanup budget — about $260 million less than the fiscal year 2002 budget. But this time there was a twist. Hanford, along with other U.S. Department of Energy (DOE) sites, could apply for additional funds from an $800 million set-aside for expedited cleanup activities.

DOE Richland Manager Keith Klein and Office of River Protection (DOE-ORP) Manager Harry Boston said Hanford was well positioned to compete for funds from the $800 million dollar expedited cleanup account. They suggested a number of Hanford projects could be accelerated, including work at the Plutonium Finishing Plant, moving spent fuel from the K-Basins, and studying whether some waste tanks might be closed sooner than the current plans.

Washington Governor Gary Locke met with Energy Secretary Spencer Abraham and told him he expected DOE to meet its cleanup obligations at Hanford. Locke told Abraham he endorsed the idea of

◄ *Demolition work at Hanford.*

"Without more details, I don't know if this is scary or a good opportunity. Initially, it looks daunting…leaning toward scary."

– Todd Martin, Hanford Advisory Board Chair, on $800 million available for expedited cleanup activities. (*Tri-City Herald,* February 5, 2002).

"We're not taking money away. But we're reinvesting money to do more work."

– DOE Assistant Secretary Jesse Roberson. *(Tri-City Herald,* February 5, 2002).

"These (accelerated plans) are things we've already been doing. We just have to tie it up, wrap it in a ribbon and present it to the powers-that-be back there (in Washington, D.C.)."

– DOE Richland Manager Keith Klein. (*Tri-City Herald*, February 9, 2002).

"(DOE) and the Office of Management and Budget are promising that the days of fighting over nuclear cleanup budgets are behind us. I sincerely hope they are."

– Washington Senator Patty Murray. (*Tri-City Herald*, March 7, 2002).

"In 13 years since signing the Tri-Party Agreement, we've had (three) presidents and six Secretaries of Energy. Each administration has spent time and money rethinking the Hanford cleanup. Each ultimately came to the same conclusions: there is no quick fix…Let me be clear. Washington State will not sit back and allow the Federal government to declare the Hanford cleanup a success by simply moving the goal line. That is not accelerated cleanup by our standards."

– Statement of Washington Attorney General Christine Gregoire to the Senate Committee on Energy and Natural Resources. (July 11, 2002).

"We believe there can be smarter, more cost-effective cleanup and accelerated cleanup within terms of our agreement. What there cannot be, and what we cannot accept, is less cleanup. Less cleanup is not accelerated cleanup. It's just less cleanup."

– Mike Wilson, Washington Department of Ecology, to the House Energy and Commerce Committee's oversight and investigation subcommittee. (*Tri-City Herald,* July 20, 2002).

accelerated cleanup by providing incentives to contractors but that could not come at the expense of providing full funding for cleanup.

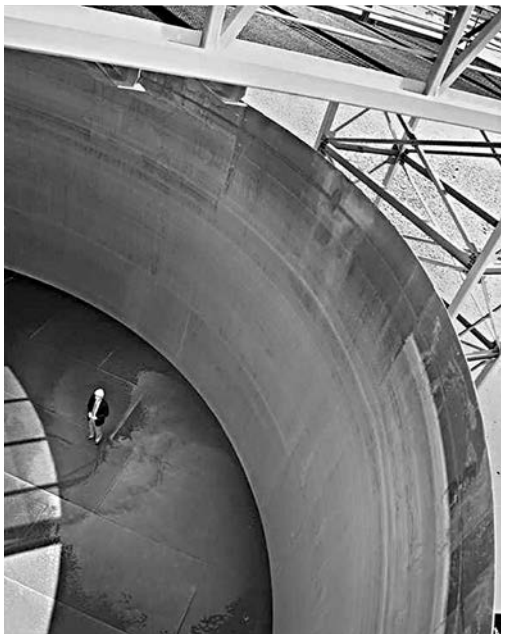
DOE, the State of Washington and the U.S. Environmental Protection Agency signed a Letter of Intent to accelerate cleanup at Hanford. The intent was to complete cleanup by 2025 or 2035, instead of DOE's current estimate of 2070. DOE agreed to seek an additional $433 million in funding for Hanford for fiscal year 2003 from DOE's proposed expedited cleanup account. DOE also pledged to fund the accelerated cleanup at Hanford through at least 2006. State and federal officials had been working on acceleration plans for more than a year.

In May, DOE released a draft cleanup plan to accelerate Hanford cleanup. The plan included earlier operation of the vitrification facilities; using some alternative technology for much of the lower activity waste from the tanks; beginning to close tanks within the next few years; and accelerated removal of spent fuel from the K-Basins.

Washington Attorney General Christine Gregoire told a Senate committee there were too many unanswered questions for her to support an accelerated cleanup schedule proposed for Hanford, in return for additional cleanup funds. Gregoire said a faster schedule was welcome but that the state would remain resolute in its insistence on a full and complete cleanup of dangerous wastes at the site.

In February, DOE announced that 40 percent of the 70 Senior Executives in the Environmental Management program were being reassigned. A total of 27 senior staff were involved, including DOE-ORP Manager Harry Boston and Richland Deputy Manager Bob Roselli. Both were assigned to Headquarters. Roy Schepens would move from

Retrieving drums of waste from a Hanford burial ground. ►



▲ *Hanford's Cold Test Facility.*

the Savannah River Site in South Carolina to replace Boston as the DOE-ORP Manager.

Construction of the Cold Test Facility — a mock-up of a Hanford tank — was completed. The large open-top tank was the same width as one of Hanford's million gallon tanks. The facility would be used to demonstrate tank cleanup equipment and train workers on waste retrieval and other techniques. The mock tank, located near the HAMMER training facility, would hold about 600,000 gallons of fake sludge and waste.

Allied Technology Group's (ATG) Richland facility resumed limited operation while the company remained in bankruptcy. The company treated chemical and low-level radioactive wastes to reduce the volume and convert the waste to a safer form. DOE was counting on ATG treating large volumes of Hanford's waste.

DOE concluded a tritium plume less than four miles from the Columbia River would not reach the river in concentrations large enough to pose harm. The tritium came from the 618-11 burial ground, adjacent to Energy Northwest's commercial nuclear power plant at the southern edge of the Hanford Site. DOE concluded it would take 70 to 80 years for the plume to reach the river.

DOE auditors said the K-Basin project was behind schedule and Tri-Party Agreement milestones might need to be renegotiated. DOE Richland Manager Klein disagreed and said changes made in the project — including the start of 24-hour, seven day a week operation — should allow them to eventually get back on schedule.

In August, DOE removed the 100th canister of spent fuel from the K-Basins and by year's end, DOE and its contractors had successfully removed about one third of the 2,100 tons of spent fuel in the two basins. In December, DOE began moving spent nuclear fuel from the K-East basin to the nearby K-West basin, where the fuel would be

"The purpose of these reassignments is to better leverage the unique talents of these executives, force better integration between the field and headquarters…and to stimulate new thinking and creative solutions to our cleanup challenges."

– DOE Assistant Secretary Jesse Roberson. (DOE News Release, February 13, 2002).

"Given that we don't know the source of the tritium, other assumptions about the contents of the burial ground are just that — assumptions. We do not, for example, know whether we will have other releases from the burial ground, perhaps involving even higher levels of tritium or some other longer-lived radionuclides."

– Letter from Ken Niles, Oregon Office of Energy to Dave Einan, U.S. Environmental Protection Agency, suggesting more characterization and more frequent groundwater sampling was necessary at the 618-11 burial ground. (April 9, 2002).

"This milestone marks a definite turning point in this very important project, as now most of the fuel in the K-West basin has already been removed and we can squarely focus on our next major cleanup task…safely processing and storing the K-East basin fuel."

– Keith Thomson, President of Fluor Hanford. (*The Hanford Reach,* December 2, 2002).

"We used the best scientific methods available, and we did not find an increased risk of thyroid disease in study participants from exposure to Hanford's iodine 131. If there is an increased risk of thyroid disease, it is too small to observe."

— Epidemiologist Paul Garbe, U.S. Centers for Disease Control and Prevention. (*Tri-City Herald*, June 22, 2002).

"This does not prove that Hanford radiation has no effect. It doesn't prove it didn't happen to me, just that it cannot be graphed."

– Jay Mullen, who grew up in Spirit Lake, Idaho and had thyroid disease. (*Tri-City Herald,* June 22, 2002).

sorted, repackaged, and then moved to an underground storage vault in Hanford's central plateau.

DOE and its regulators estimated that about 40 percent of the contaminated soil around Hanford's nine reactors had been cleaned up. About three million tons of contaminated soil and debris had been removed from Hanford's 100 Area.

The Hanford Thyroid Disease Study concluded that Hanford downwinders were no more likely to have thyroid disease than people who lived elsewhere. The 13 year-long study, conducted by the Fred Hutchinson Cancer Research Center, looked at the thyroid health of 3,440 people, most of them children who lived downwind from Hanford during the years of its largest releases of radioactive materials to the environment. Draft results had been released in 1999.

In June, Hanford workers successfully completed the conversion of 1,126 gallons of plutonium-laced liquids at Hanford's Plutonium Finishing Plant to a much safer powder. The powder was then baked to an even safer form.

Two environmental organizations and the Yakama Indian Nation filed a federal lawsuit against DOE in an effort to prevent them from leaving radioactive waste in underground storage tanks at Hanford and two other DOE sites. DOE was hoping to reclassify some of the waste in the tanks as "incidental to processing" — using a 1999 DOE Order to do so. The States of Washington and Oregon later filed "friend of the court" petitions to participate in the lawsuit.

Work began in January and continued through much of the year to move hundreds of barrels containing uranium chips and oil out of a burial ground just north of the 300 Area. The barrels were discovered during excavation work in 1998. The Hanford fire in 2000 came within a few hundred feet of the 618-4 burial ground, threatening 300 of the barrels which had been uncovered in 1998. The work fell behind schedule because of more severe soil contamination than

Workers at the 618-4 burial ground. ►

predicted. The barrels were moved to a concrete pad in the 200 Area until final disposal was determined. Only about 800 barrels turned out to be in the burial ground — far fewer than the 1,500 expected. The last of the barrels was moved from the burial ground in October.

DOE committed to shipping out the equivalent of two barrels of transuranic waste for every barrel the site took for temporary storage. In a letter to regulators and stakeholders DOE-Richland Manager Klein said this would occur within 18 months after receipt of waste from other sites. DOE wanted to ship some transuranic waste to Hanford so it could move forward with closing a few smaller sites. Klein also said Hanford would eventually refrain from burying low-level waste in unlined trenches and instead would use lined trenches with leachate collection systems. He also asked the public to accept that Hanford would have to take some waste from other sites as part of the nationwide cleanup effort.

In December, the State of Washington agreed to allow limited amounts of transuranic waste from two DOE sites to be sent to Hanford for interim storage. In return, DOE pledged to reach agreement with the state by March 1 on new Tri- Party Agreement milestones for characterizing and retrieving Hanford's buried mixed wastes. Washington was ready to go to court before the agreement was struck.

Three trucks carrying remote-handled transuranic waste arrived at Hanford in mid-December from DOE facilities in Ohio and California.

After DOE issued a directive to no longer maintain the Fast Flux Test Facility in a condition for a possible restart, DOE and its regulators agreed to a tentative schedule to shut down the reactor. Just before liquid sodium was to be drained from the reactor, Benton County filed suit in federal court to stop the work. DOE initially agreed to stop decommissioning work for two weeks and then extended that delay until at least March 2003. The delay provided supporters of the reactor additional time to try and convince the federal government to turn the reactor over to private industry for the production of medical isotopes.

Spent fuel assemblies from the Shippingport reactor in Pennsylvania — stored in Hanford's T Plant for more than 20 years — were moved to Hanford's canister storage building.

Bechtel Hanford workers completed the cocooning of DR Reactor. The DR Reactor became the second Hanford reactor to complete the cocooning process.

"I ask you to consider that we are moving past old approaches to a new collaborative approach to cleanup, working in close partnership with our regulators and others. I ask that you recognize there are many sides to every issue and that rarely are people (or even agencies) acting in bad faith."

– Hanford Manager Keith Klein. (Letter to Regulators, Tribal Nations, and Members of the Public, August 22, 2002).

"While USDOE may be able to justify temporarily bringing small amounts of waste to Hanford from other small sites, I am concerned that other USDOE sites will attempt to unload their wastes by shipping large amounts of wastes to Hanford. Hanford must not be made a dumping ground to make progress on other sites."

– Letter from Oregon Governor John Kitzhaber to Energy Secretary Spencer Abraham. (November 12, 2002).

"This is the Department of Energy's last chance to get on with the retrieval, processing and permanent disposal of what has been a skeleton in the Hanford closet."

– Washington Attorney General Christine Gregoire, on an agreement to move forward with characterizing and retrieving Hanford's buried mixed wastes. (Governor's Office News Release, December 16, 2002).

◄ ***Before and after photos show the changes at DR Reactor following successful cocooning of the former plutonium reactor.***

"We intend to beat those milestones, not just meet them, but beat them."

– Roy Schepens, manager of DOE's Office of River Protection, pledging to move forward with closing some of Hanford's tanks. *(Tri-City Herald,* August 16, 2002).

In December, Hanford workers began pumping liquid waste from tank C-103, the last of Hanford's single-shell tanks which had not had liquids previously pumped. The pumping beat a Tri-Party Agreement milestone by five months. Pumping was underway on 13 single-shell tanks to remove the remaining 460,000 gallons of free liquids. More than 2½ million gallons of liquids had been pumped from the single-shell tanks since 1998.

Ecology agreed to a DOE plan to accelerate closure of seven underground high-level radioactive waste storage tanks. Under the proposed revision to the Tri-Party Agreement, DOE would begin closing its first tank in 2004 — 10 years ahead of schedule. Seven tanks in all were to be closed by 2011.

DOE and CH2M Hill Hanford Group agreed to contract incentives to try and close up to 40 of Hanford's single-shell tanks by 2006. The plan was contingent upon – among other things – DOE's ability to certify about one million gallons of waste in the tanks as transuranic waste and ship it off to a disposal site in New Mexico. State regulators said many details still needed to be worked out – including an agreement on what "closing" a tank meant.

An exhibit on Hanford opened at Portland's Oregon Museum of Science and Industry. Titled "Hanford at the Half Life," the exhibit explained Hanford's history as the world's first site to manufacture plutonium for nuclear weapons and its current mission to clean up the enormous amounts of waste generated during more than 40 years of plutonium production. Visitors to the exhibit could measure radiation, discover how radioactive waste had seeped into the soil, undergo a radiation exposure screening, and learn about the efforts to control the contamination and protect the Columbia River.

Part of the Oregon Museum of Science and Industry's Hanford display. ►

About 150,000 gallons of high-level waste was pumped into tank SY-101 in November — the first time that waste had been transferred to that tank in many years. Wastes in SY-101 previously had generated potentially explosive hydrogen — preventing the addition of any wastes.

Hanford workers entered the cocooned C Reactor for the first time in five years. They found only a small oil drip inside the structure and made a minor repair to the roof. Otherwise, the reactor structure was just as it was left when workers sealed the reactor in 1998.

Oregon's Hanford Waste Board issued a report which recommended additional work to help protect the Columbia River from Hanford contaminants. The 28 recommendations included actions to protect salmon in the Hanford Reach; stop further vadose zone and groundwater contamination; clean up vadose zone and groundwater contamination by 2012; address science and technology needs; and develop and implement a comprehensive groundwater monitoring program.

"There is uncertainty about what will happen if Hanford's wastes continue to migrate towards and into the Columbia River. However, the Board believes that the Columbia River is too important a resource to the people of the Pacific Northwest and the nation to fail to act now because of that uncertainty."

– From 'River Without Waste: Recommendations for Protecting the Columbia River from Hanford Site Nuclear Waste' (Oregon Hanford Cleanup Board, December 2002).

Columbia River as it flows through the Hanford Site. ▼

Workers place the first structural steel in the high-level waste treatment facility. ►

Tank Waste Treatment

Bechtel National estimated that construction and operation of the Hanford tank waste vitrification facilities could occur sooner than existing schedules but at a higher cost. Bechtel estimated that construction and testing could be complete a year early, by 2010. The company estimated that vitrifying ten per cent of Hanford's tank waste could be completed almost five years early, by 2013. Overall cost estimates rose from $3.965 billion to $4.447 billion.

Ecology agreed to stop assessing a $10,000 per week fine against DOE after signing off on DOE's recovery plan to keep the vitrification project on schedule. The fine was levied after DOE missed a 2001 milestone to begin construction of the vitrification facilities. The fines totaled $305,000 and were waived once construction of Hanford's high-level waste vitrification facilities began in July. Structural concrete was poured as part of the 5-foot thick, steel-reinforced foundations and basement walls for one of two waste processing buildings. The project would require 58,000 tons of steel, 160 miles of piping and 1,260 miles of electrical cable. Two cement processing plants had been installed to produce the concrete that would be needed over the next five years.

"The regulators have given us the green light, our construction force is geared up, and our subcontractors are ready."

– Ron Naventi, Bechtel's vitrification project manager. (*Tri-City Herald,* July 10, 2002).

Around the DOE Complex

DOE announced its plans to move forward with the disposal of 34 metric tons of surplus weapons grade plutonium by turning it into mixed oxide (MOX) fuel for use in nuclear reactors. Previously, DOE endorsed a dual-track approach to dispose of the plutonium, including turning some of the material into MOX reactor fuel and immobilizing the remaining plutonium in radioactive glass logs for long-term storage. Eliminating immobilization saved nearly $2 billion. In September 2000 the United States and Russia signed an agreement committing each country to dispose of 34 metric tons of surplus plutonium. The MOX conversion process was expected to cost $3.8 billion over 20 years, including the construction of two new conversion facilities at DOE's Savannah River Site in South Carolina.

In December, President Bush signed into law a provision that would award South Carolina up to $100 million a year if the federal government failed to remove surplus weapons-grade plutonium from the state on schedule. If the MOX program did not meet schedules or was not successfully operating, DOE must remove all the plutonium from Savannah River or pay the fines.

The federal government continued with its efforts to site a high-level waste disposal site at Yucca Mountain in Nevada. In February, Energy Secretary Abraham formally recommended to President Bush that the Yucca Mountain site be developed as the nation's first long-term geologic repository for high-level radioactive waste.

That action set in motion a process whereby President Bush notified Congress that he considered Yucca Mountain qualified for a construction permit application; a veto by Nevada Governor Kenny Guinn; a 306-117 vote in the U.S. House of Representatives to override

◄ *Aerial view of the Yucca Mountain crest.*

"I have considered whether sound science supports the determination that the Yucca Mountain site is scientifically and technically suitable for the development of a repository. I am convinced that it does."

– Letter from Energy Secretary Spencer Abraham to President Bush. (DOE News Release, February 14, 2002).

"Nevada's state slogan is 'Battle Born.' We came into this union fighting for our preservation, and we will continue to show the country we are united in our fight against Yucca Mountain."

– Nevada Governor Kenny Guinn. (*Las Vegas Sun*, April 8, 2002).

"I look at their record (in court). And the scoreboard says state of Nevada: zero."

– Idaho Senator Larry Craig – who voted in favor of Yucca Mountain – about Nevada's chances to prevail in court. (*Las Vegas Sun*, July 10, 2002).

"Our best chance in defeating Yucca Mountain is in the federal courts, where impartial judges will hear the factual and scientific arguments as to why Yucca Mountain is not a safe place to store this nation's high-level nuclear waste."

– Nevada Governor Kenny Guinn. (Associated Press, July 24, 2002).

Nevada's veto; a 60-39 vote in the U.S. Senate to override Nevada's veto; and formal approval by President Bush as the site of the nation's high-level nuclear waste repository. Nevada vowed to continue to pursue five lawsuits pending in federal court.

The U.S. Health and Human Services Department said at least 15,000 cancer deaths in the United States were probably caused by radioactive fallout from Cold War nuclear weapons tests. The new study also suggested 20,000 non-fatal cancers among U.S. residents could also be linked to fallout from above-ground tests.

DOE Headquarters released a 'Top-to-Bottom' review of its Environmental Management program. The report identified a number of weaknesses in the program and recommended improving DOE's contract management; moving the cleanup program to an accelerated, risk-based cleanup strategy; and aligning DOE's internal processes and its scope to support those changes.

A General Accounting Office (GAO) report said despite massive changes in DOE's contracting, it did not appear that its contractors were accomplishing nuclear waste cleanup any better than under the old contracts. DOE had moved from mostly cost-reimbursement contracts to performance based contracts. However, the GAO found that DOE's focus was on changing its contract process, rather than improving cleanup results.

"We do have concerns about the wisdom of trying to run the Environmental Management cleanup program like a business. We agree that DOE must be efficient in its spending. But, a commercial model is not appropriate for an environmental cleanup. The primary motivation for a commercial enterprise is profit… The primary motivation for cleaning up toxic and radioactive waste should be worker, public and environmental safety and a vision of restoring and healing a damaged land."

– Letter from Oregon Office of Energy Acting Director Michael Grainey to Energy Assistant Secretary Jesse Roberson on DOE's Top-to-Bottom Plan. (February 28, 2002).

2003

"You can't just call a monkey a turkey and say it doesn't need to be in a cage. They can't do cleanup on the cheap — they've got to deal with the high-level waste."

– Sheryl Hutchison, Washington Department of Ecology, after a federal judge overturned a U.S. Department of Energy Order that would have allowed DOE to reclassify high-level radioactive waste and leave it at Hanford. (Associated Press, July 3, 2003).

The Cleanup

The State of Washington filed suit in March in federal court to stop the U.S. Department of Energy (DOE) from shipping additional transuranic waste to Hanford. DOE and Washington had been unable to reach agreement on enforceable milestones for the retrieval of buried transuranic waste at Hanford. DOE agreed to halt further shipments until oral arguments were heard in mid-April. Four activist groups also sued DOE in an attempt to halt the shipments. Heart of America Northwest, Columbia Riverkeeper, the Sierra Club and the Washington Physicians for Social Responsibility said the Bush Administration had failed to consider the potential for a terrorist attack on transuranic waste being shipped by truck on public highways.

The dispute soon grew well beyond the issue of small amounts of transuranic waste coming to Hanford.

Washington Ecology Director Tom Fitzsimmons issued a Director's Determination which required DOE to submit a detailed plan and schedule by August 31 for developing storage and treatment facilities

◄ *A truck carrying transuranic waste from a DOE facility in California is inspected near Ashland, Oregon, before proceeding to Hanford.*

"We received assurances that the federal government would prepare to ship approximately 78,000 barrels of radioactive waste out of Hanford, if we let another 170 barrels in. But the Department of Energy has not lived up to its end of the bargain."

– Washington Attorney General Christine Gregoire. (State of Washington News Release, March 4, 2003).

"The issue isn't whether we're going to get the work done. It's whether we need the state to force us to do the work. We have demonstrated we know what our obligations are and we're committed to carrying them out."

– Energy Assistant Secretary Jesse Roberson. (*Seattle Post Intelligencer,* March 5, 2003).

A transuranic waste burial trench. ►

"Recent actions by the state of Washington could have a chilling effect on cleanup operations at Hanford and elsewhere."

– Energy Assistant Secretary Jesse Roberson. (*Tri-City Herald*, April 10, 2003).

"The only chilling effect on Hanford's cleanup was (DOE's) decision to walk away from a negotiated settlement to dispose of (84,000) barrels of transuranic wastes at Hanford."

– Washington Attorney General Christine Gregoire. (*Tri-City Herald*, April 10, 2003).

"The unraveling of the relationship between the state and the Department of Energy is bad for this community…The trust necessary to hammer out cleanup particulars will be lost, and the estrangement will invite the rise of fringe groups to bog down the discussion."

– *Tri-City Herald* Editorial. (April 22, 2003).

"We have tried exhaustively to establish a cooperative relationship with the Department of Energy to improve the pace of cleanup at Hanford, but we have been thwarted by shifting policies and broken promises."

– Ecology Director Tom Fitzsimmons. (Ecology News Release, April 30, 2003).

"This is completely ludicrous — to think that what we're calling for is for cleanup activities to stop. This is one sentence in a many-page Order they're quibbling about."

– Sheryl Hutchison, Ecology Department spokeswoman. (Associated Press, May 9, 2003).

needed to handle buried solid wastes and gave DOE until mid-2012 to actually have those facilities in operation.

DOE responded by filing suit against the State of Washington.

In May, Federal District Court Judge Alan McDonald granted a temporary injunction, prohibiting shipments of transuranic waste to Hanford until litigation over the waste was resolved.

Ecology issued an Administrative Order against DOE for violating the state's hazardous waste laws for failing to manage radioactive hazardous wastes buried in unlined trenches at Hanford. The state issued the Order independently of the Tri-Party Agreement, contending the waste posed an "imminent and substantial endangerment to public health and the environment." The Order required DOE to retrieve the wastes by certain deadlines.

In May, DOE ordered its contractors to halt some cleanup work at Hanford, saying Ecology's Administrative Order left them no alternative. The Order said DOE should stop activities that would add to the backlog of untreated mixed waste. DOE said this impacted cleanup work at the Plutonium Finishing Plant, work in the tank farms, and removal of sludge from the K-Basins.

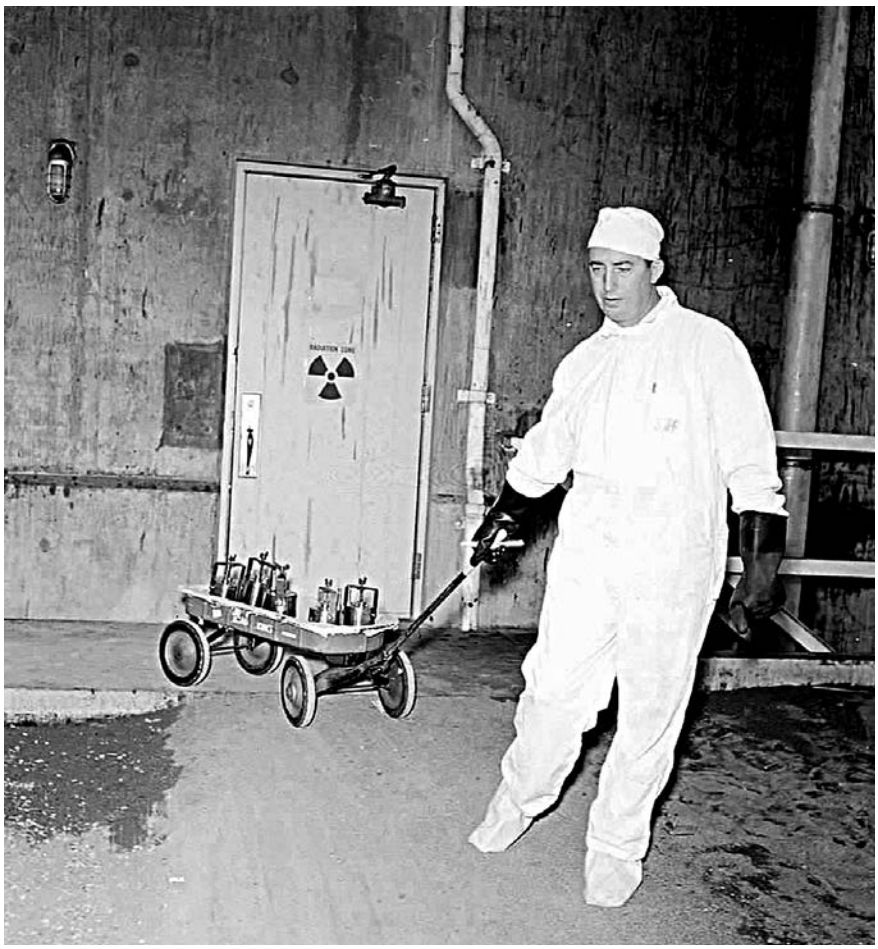
Ecology temporarily suspended that part of its Administrative Order which DOE interpreted as forcing a shutdown of some cleanup work and DOE ordered all cleanup work at Hanford to resume.

In June, a coalition of citizens groups announced the filing of a ballot measure in Washington state for the November 2004 election that would ban new imports of hazardous and radioactive wastes to Hanford. The initiative would also ban the use of unlined soil trenches for waste disposal and required cleanup of contaminated groundwater.

In October, DOE and Ecology reached agreement on a schedule for retrieving, storing and processing certain buried waste at Hanford. Questions about who had jurisdiction of the waste prior to its characterization would continue through the legal process. Under the agreement DOE would begin retrieving suspect contact-handled transuranic waste by November 15 and complete retrieval of this waste by 2010. The waste was buried between 1970 and 1988 — mostly in barrels — and was intended to be dug up at some point. Retrieval of remote-handled transuranic waste would begin by 2011 and DOE would have the capability to treat such waste by 2012. The agreement also specified annual volume requirements to assure that adequate progress was being made on retrieval, characterization and treatment of the waste.

Within a week, Fluor-Hanford began digging up barrels of suspect transuranic waste from Hanford's low-level burial grounds, easily beating the deadline.

There was considerable progress with the plutonium stabilization program at the Plutonium Finishing Plant (PFP). Hanford workers completed stabilization of several hundred plutonium polycubes. The polycubes were impregnated with pure plutonium oxide and presented many technical challenges that needed to be resolved before they



◄ *A Hanford worker moving plutonium in 1954.*

"Long-term insidious dangers to public health exist at Hanford due to the massive amounts of uncontrolled radioactive and chemically-hazardous wastes there. Importation of additional wastes before Hanford is safely and legally cleaned up defies logic."

– Charles Weems, M.D., of Washington Physicians for Social Responsibility. (Citizen Group News Release, June 7, 2003).

"Fourteen years after the Tri-Party Agreement was first signed, we finally have clean-up milestones for the largest remaining block of waste at Hanford. This is a tremendous win for Hanford and the people of Washington."

– Ecology Interim Director Linda Hoffman. (Washington Department of Ecology News Release, October 24, 2003).

"This agreement signals a return to a more cooperative and collaborative approach to the challenges presented by the cleanup of this complex site."

– Hanford Manager Keith Klein, on the agreement to a new schedule for dealing with certain buried waste at Hanford. (DOE News Release, October 24, 2003).

"We're acting now before these drums can further degrade, become harder to retrieve, and affect the environment."

– Hanford Manager Keith Klein, on the retrieval of barrels of suspect transuranic waste. (DOE News Release, October 27, 2003).

could be stabilized to allow long-term storage. Workers at PFP also completed the processing of plutonium-laced residues. That left just the conversion of plutonium-laced solids into safer forms to complete the stabilization of Hanford's stored plutonium.

There was progress as well with the removal of spent nuclear fuel from the K-Basins. By January, Hanford workers completed the removal of 1,055 tons of spent fuel — the equivalent of emptying one of the two basins. By March, the 200th canister of spent nuclear fuel was sent from the K-Basins to the Canister Storage Building. However, similar progress was not made in the removal of sludge from the K-Basins. In April, the U.S. Environmental Protection Agency (EPA) levied a $76,000 fine against DOE for failing to begin the removal of nearly 50 cubic meters of sludge from Hanford's K-East basin. Under the Tri-Party Agreement, that work was to have begun by December 31, 2002.

DOE submitted a more than two billion dollar request for Hanford's fiscal year 2004 funding. The amount represented an increase of between $37 and $63 million, depending on the accounting process. It allowed an increase in funding for cleanup along the Columbia River, maintained funding for construction of the vitrification plant facilities, and allowed for completion, or near-completion of the spent fuel and plutonium stabilization projects.

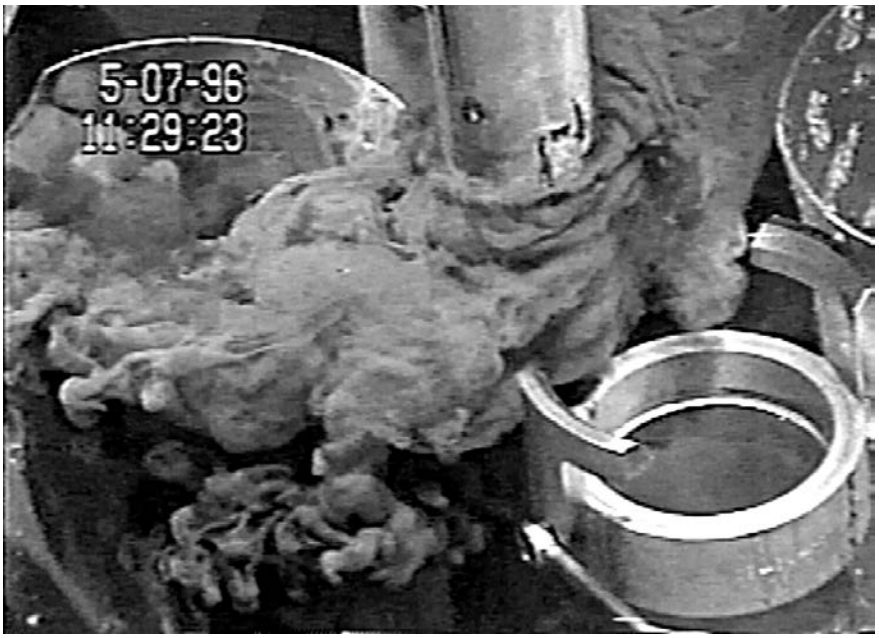
The Ninth U.S. Circuit Court of Appeals refused to stop decommissioning of the Fast Flux Test Facility (FFTF). Benton County had sought an injunction to prevent DOE from draining the sodium from the reactor or doing other, irreversible work on the reactor. Soon after, workers began draining hot liquid sodium from a secondary cooling loop of the FFTF, effectively beginning the permanent shutdown of the reactor. In May, the Tri-Parties agreed to new milestones for decommissioning the FFTF.

"This is what we wanted to see. Clearly, we'll have to dig into it to see if there are any bugaboos."

– Sheryl Hutchison, Department of Ecology spokeswoman, on DOE's budget request. (*Tri-City Herald,* February 4, 2003).

"I don't know if they knew they were sentencing (the Fast Flux Test Facility) to death. The scenario before us tonight is lose-lose."

– Benton County Commissioner Claude Oliver. (*Tri-City Herald*, April 4, 2003).



Sludge stirred up in one of the K-Basins. ►

▲ ***Clean-up work along the Columbia River.***

DOE awarded a $1.05 billion contract for work on the Columbia River Corridor to the Washington Closure Company, headquartered in Boise. The contract included cocooning of three reactors, cleaning up 269 waste sites and 46 burial grounds, and demolishing surplus buildings. The contract included an option for additional work. The contract award was protested by Bechtel, which had been doing the river corridor cleanup work for the past nine years.

The Yakama Nation announced its intent to sue the federal government for its failure to protect the Columbia River from Hanford contaminants. The tribe contended that damages to the natural resources — particularly salmon — had occurred because of chemicals and radioactive materials released into the Columbia River.

A draft Environmental Impact Statement for cleanup of the West Valley Demonstration Project in New York proposed — among other options — to send its high-level and transuranic waste to Hanford for indefinite storage.

The states of Washington and Oregon, the Yakama Nation, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Hanford Advisory Board, the Oregon Hanford Cleanup Board, and others concluded that the latest version of the draft Hanford Solid Waste Environmental Impact Statement was still deficient.

A July range fire burned about 2,000 acres on the edge of Rattlesnake Mountain, including about 300 acres of the Arid Lands Ecology Reserve.

"We have to do whatever is necessary to see that our river is fully healed and the salmon runs restored."

– Ross Sockzehigh, Yakama Tribal Council chairman. (Associated Press, June 6, 2003).

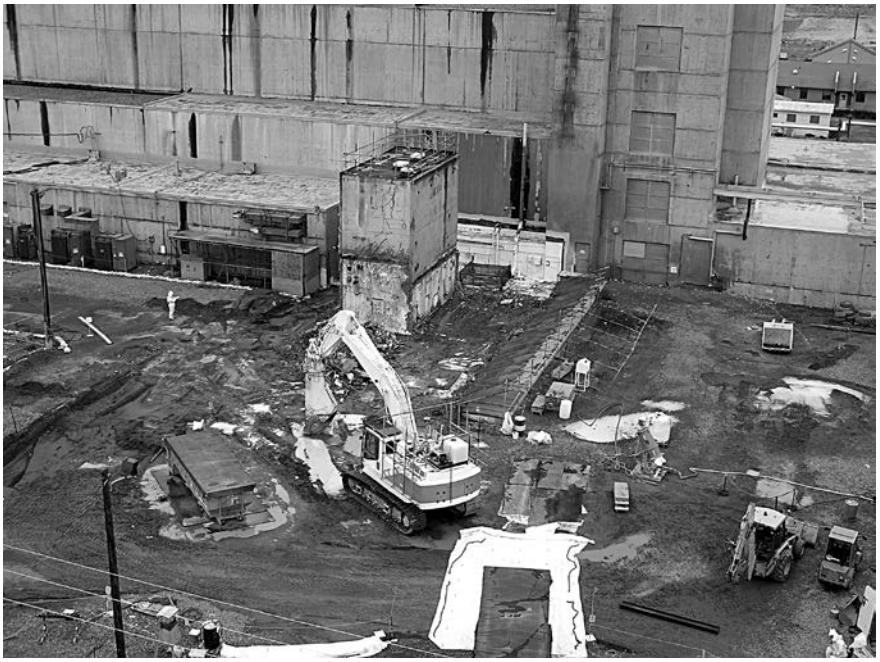
"Hanford tank workers are like canaries in a coal mine."

– Tom Carpenter, Government Accountability Project attorney. (*Tri-City Herald,* September 16, 2003).

The Government Accountability Project (GAP) said Hanford's tank farm workers were repeatedly being exposed to hazardous chemical fumes. A GAP report said workers' protective breathing equipment and equipment to monitor vapor releases was inadequate to protect workers from chemicals leaking from Hanford's waste storage tanks. GAP said from January 2002 to August 2003, 67 tank farm workers required medical attention for problems including headaches, skin irritation and breathing difficulties, a sharp increase from 15 years ago. DOE and CH2M Hill officials declined to comment on the specifics of the report but said reported incidents had increased because of more stringent reporting requirements.

Successful retrieval of waste from tank C-106 was proceeding. The bottom of the tank was seen during modified sluicing operations. The addition of oxalic acid appeared successful in breaking up the solids in the tank. This tank was the first to reach a possible interim closure state.

Hanford tank farm workers. ▼



◀ *Demolition work on the 233-S facility.*

Hanford workers began to tear down the 233-S facility, the site's first large plutonium-contaminated structure to be dismantled. The 3,500 square foot, three story facility was expected to be demolished in about four months. It was the first large plutonium-contaminated facility that would be demolished at a DOE site without being covered by a tent.

The cocooning of F Reactor was completed ten months ahead of schedule. It was the third Hanford reactor to be sealed up. Bechtel finished cocooning C Reactor in 1998 and DR Reactor in 2002. F Reactor was the third Hanford reactor to produce plutonium, starting up in February 1945 and shutting down in June 1965.

Following the discovery of elevated chromium levels in groundwater in the 100-D area, Ecology asked DOE to cut and cap water lines that were potentially leaking, extend a chemical barrier, and take additional samples to find the source of the contamination.

Tank Waste Treatment

DOE announced in January that construction of Hanford's high-level waste vitrification facilities would be delayed by up to 10 months because of poor engineering. As a result, DOE withheld $3 million in payments to Bechtel National, the lead design and construction contractor. Bechtel officials said they had been working on corrective measures since the problems were discovered in September. DOE said the planned 2007 hot-start of the facilities might need to be delayed.

DOE officials said hundreds of millions of dollars could be saved if the pre-treatment process for Hanford's tank wastes did not include

"Without Tc-99 removal, and only two low-activity melters, finding an acceptable, low-cost supplemental technology that is capable of meeting the required standards is nearly impossible…Further, Ecology has grave concerns with what appears to be a trend to minimize the capabilities of the (waste treatment facilities) as it relates to pre-treatment and low-activity waste vitrification throughput."

– Letter from Mike Wilson of Ecology to DOE-Office of River Protection Manager Roy Schepens. (January 15, 2003).

▲ *Concrete crews working in the high-level waste treatment facility.*

removing technetium 99. That would result in much of the technetium being buried at Hanford. Ecology officials and others voiced strong concerns about the proposal.

DOE adopted a new schedule in May for the start up of the vitrification plant. By July, they had reached agreement with the State of Washington on basically the same schedule.

The operational date of 2011 remained the same. Under the proposed new schedule, construction would mostly end by 2008. Operational testing with surrogate waste would begin by February 2009 and "hot" testing would begin in 2010. DOE also had a January 2005 deadline to report to the state on proposed technologies to supplement vitrification.

The Waste Treatment Plant Project's first structural steel was placed in the low-activity waste treatment facility in July, beating a Tri-Party Agreement milestone by three months.

A General Accounting Office report said DOE faced significant legal and technical challenges to successfully reduce the costs and time required for cleanup of its high-level wastes, including the 53 million gallons of waste stored in Hanford's underground tanks. A key legal

challenge cited involved DOE's authority to decide that some waste with relatively low concentrations of radioactivity could be disposed on site. A key technical challenge cited was that DOE's approach relied on laboratory testing to confirm separation of the waste into high-level and low-activity portions.

In July, Federal Judge Lynn Winmill overturned a DOE Order that would have allowed DOE to reclassify high-level radioactive waste and leave it at Hanford and two other DOE sites. Judge Winmill ruled that DOE Order 435.1 directly conflicted with provisions of the 1982 Nuclear Waste Policy Act.

In response, Energy Secretary Spencer Abraham wrote to House Speaker Dennis Hastert and said the federal court decision could cause decades of delay in cleanup and substantially increase costs. He asked Congress to re-open the Nuclear Waste Policy Act to clarify that DOE had the authority to define high-level waste.

The Attorneys General from Oregon, Washington, Idaho and South Carolina responded with a letter to Congress, which opposed DOE's attempts to reclassify high-level radioactive waste.

The U.S. House of Representatives went on record in October as being opposed to the effort by DOE to reclassify high-level radioactive waste at Hanford and two other DOE sites. By unanimous voice vote the House approved a motion instructing House conferees negotiating energy legislation with the Senate not to amend the Nuclear Waste Policy Act to give DOE the authority it was seeking to reclassify high-level waste.

The State of New Mexico opposed DOE's plans to send some tank waste DOE said was transuranic to the Waste Isolation Pilot Plant (WIPP). Hanford officials said about one million gallons of waste in eight tanks was transuranic waste, even though it had been managed for many years as high-level waste. New Mexico Governor Bill Richardson ordered his state environment department to change WIPP's New Mexico permit to specifically forbid it from accepting any reclassified high-level wastes.

DOE announced a decision to pursue development of just one supplemental technology for use in immobilizing low-activity waste from Hanford's tanks. DOE said bulk vitrification showed the most promise among three technologies being evaluated.

"DOE does not have discretion to dispose of defense (high-level waste) somewhere other than a repository established under (the Nuclear Waste Policy Act)."

– From the decision by Federal Judge Lynn Winmill. (July 3, 2003).

"In our view, amendment of federal law is wholly unnecessary to remedy the defects the court identified in the Department's internal policies. Moreover, enactment of the proposed legislation would merely serve to do what the states objected to in the first instance by giving the Department unbounded discretion to reclassify high-level radioactive waste."

– Letter from the Attorneys General of Oregon, Washington, Idaho and South Carolina to the Congressional Leadership. (August 28, 2003).

Around the DOE Complex

DOE spent much of the year refining its draft "Risk-Based End States" policy, which tied cleanup levels to future land use by considering the associated risks to human health and the environment consistent with that use. State regulators from throughout the nation generally objected and said the current compliance agreements were already based on reducing risk.

"Since 1989 until today, we were the only nuclear power in the world that could not make a pit."

– Linton Brooks, administrator of the National Nuclear Security Administration. (*Los Angeles Times,* April 23, 2003).

For the first time in 14 years, the United States regained the ability to make nuclear weapons pits. Scientists at Los Alamos National Laboratory built a plutonium pit for a W-88 warhead for a Trident nuclear missile. Plutonium pits were previously made at Rocky Flats in Colorado, which was shut down in 1989 after the FBI and EPA raided the plant because of violations of environmental laws. Los Alamos began limited production of pits and other components for the existing stockpile of nuclear weapons.

"As it stands, the past 2 ½ years have left plenty of room for doubt about your administration's intentions for cleaning up the nation's worst nuclear mess that sits in our back yard…Our congressman, Doc Hastings of Pasco, tells us we should applaud your administration's strategy to speed up cleanup. We do, in theory…But it's the reality that concerns us. If doing cleanup faster means cutting corners, that will betray this community. While your Department of Energy seems at times to say all the right things, its actions don't always back up those words."

– *Tri-City Herald* Editorial, following a visit by President George Bush to the Tri-Cities. (August 22, 2003).

2004

"The Department has worked hard to ensure that only the waste most suited for disposal at Hanford will be sent there. We have set strict limits for the amount of waste Hanford can accept, and we will ensure that disposal activities are protective of the environment and meet regulatory requirements."

– Energy Assistant Secretary Jesse Roberson after the U.S. Department of Energy issued a Record of Decision that designated Hanford to dispose of 82,000 cubic meters of waste from other DOE sites. (DOE News Release, June 23, 2004).

The Cleanup

Congress and the courts played significant roles in several major issues which dominated much of the focus during the year. As a result, several major cleanup accomplishments were somewhat overshadowed: the last of the spent fuel was removed from the K-Basins; plutonium stabilization was completed; and pumping liquid waste from the single-shell tanks was also completed. As the year ended, the significance of a slowdown at the vitrification plant construction project because of the need to reassess seismic standards was not immediately evident.

The U.S. Department of Energy (DOE) released the final Hanford Solid Waste Environmental Impact Statement (SW EIS) in February. The document ratified a previous DOE decision to send low-level and mixed low-level radioactive waste from throughout the DOE complex to Hanford for disposal. Hanford proposed to build a large, lined trench to handle much of this waste.

The State of Oregon expressed concern over DOE plans in the final SW EIS to "irreversibly and irretrievably" commit groundwater underneath much of the Hanford Site, even though DOE's analysis said there should be little to no impacts on groundwater from proposed new waste disposal activities. The U.S. Environmental Protection Agency (EPA) joined in challenging that commitment of groundwater.

Washington Department of Ecology Director Linda Hoffman, in a letter to Energy Assistant Secretary Jesse Roberson, questioned whether it was appropriate to ship more waste to Hanford when large portions of the site did not comply with federal hazardous waste requirements. In comments tied mostly to the Hanford final SW EIS, Hoffman agreed that Hanford might have an appropriate role in disposing of the nation's Cold War waste, but stated most Washington

"DOE's analysis indicates that the groundwater resource beneath the proposed facility remains free from impact and therefore may be appropriated for future beneficial uses. Selecting the preferred alternative gives no relief from responsibility for cleaning up already-existing groundwater contamination."

– Letter from Oregon Department of Energy Director Michael Grainey to Hanford Manager Keith Klein. (February 27, 2004).

"…we have continuing concerns that Hanford could become a national dumping ground for large volumes of radioactive and hazardous wastes, offsetting the progress on cleanup."

– Letter from Ecology Director Linda Hoffman to Energy Assistant Secretary Jesse Roberson. (March 9, 2004).

"We want to do our part in helping solve the national problem of nuclear waste disposal, but not if it means compounding the already massive contamination at Hanford. Washington should not bear a disproportionate burden for nuclear waste disposal."

– Washington Attorney General Christine Gregoire. (Washington Attorney General Office News Release, June 23, 2004).

"The Department of Energy's commitment to cleaning up Hanford seems to change with the seasons. Under this latest EIS, they want to walk away from the contamination in the groundwater, and there's nothing to keep them from tripling the amount of waste shipments they want to bring to Hanford."

– Washington Governor Gary Locke. (State of Washington News Release, July 16, 2004).

"This recent action will further delay and frighten the public and prolong the nation's efforts to responsibly manage these (nuclear) materials. It puts Americans on notice that Washington state is not a very good contributor to the common good, when we have the facilities — paid for by the same taxpayers — to do so."

– Mike Fox, Washington Section of the American Nuclear Society, on litigation filed by the State of Washington. (*Tri-City Herald,* July 17, 2004).

residents opposed accepting newly generated waste from ongoing nuclear weapons and research operations. She requested an opportunity for "thoughtful conversation" about how to proceed.

DOE released its Record of Decision (ROD) on the Hanford SW EIS in June. DOE agreed to limit the amount of low-level and mixed low-level waste it would bring to Hanford from other sites to 82,000 cubic meters. That was one-sixth the high-end amount analyzed in the SW EIS. A second ROD confirmed DOE's intent to ship about 100 drums of transuranic waste from Battelle Columbus in Ohio to Hanford for storage. The Battelle waste could not come immediately to Hanford because of a federal court injunction. Also included in the ROD was a commitment to immediately end the use of unlined disposal trenches. DOE also clarified its intent related to the declaration of groundwater as irreversibly and irretrievably committed.

In July, Washington announced its intent to expand existing litigation in an effort to stop further shipments of waste to Hanford. The original lawsuit, filed in 2003, sought to prevent transuranic waste from coming to Hanford. The expanded litigation included low-level and mixed low-level radioactive waste. Washington contended DOE had not conducted an adequate environmental analysis of the impacts of disposing of waste at Hanford. The state sought an injunction halting further waste shipments to Hanford until DOE adequately addressed the environmental effects of shipping and storing more radioactive waste at Hanford.

DOE agreed to temporarily stop most waste shipments to Hanford until a legal ruling was made. Some shipments — such as Navy submarine reactor compartments and laboratory waste — were not affected by the agreement.

Supporters of an initiative to ban off-site radioactive waste from coming to Hanford submitted 282,000 signatures to the Washington Secretary of State's Office in January. The Secretary of State certified they had the necessary 197,734 valid signatures to take the initiative to the Legislature. Initiative 297 also banned the use of unlined soil trenches for waste disposal and required clean-up of contaminated groundwater.

DOE agreed to stop using unlined burial trenches. Shown here is a 300 Area burial ground in 1955. ▼

◀ *Construction of burial grounds at Hanford during the production years.*

Some Tri-City area-legislators and others were concerned the initiative could end up harming clean-up efforts. Senator Pat Hale of Kennewick asked the Attorney General's office to rule on several questions pertaining to whether Initiative 297 conflicted with the U.S. Constitution, federal laws, and the Tri-Party Agreement.

Once the initiative was certified, the Washington Legislature had to enact the initiative or send it to the voters on the November ballot. The Legislature also had the option of proposing its own measure – both versions would then go to the voters. Eventually, the Legislature decided to put the initiative on the ballot.

Washington Congressman Doc Hastings said efforts to keep waste out of Hanford through Initiative 297 could result in much more waste staying at Hanford. Hastings — who normally did not comment on initiatives — said other states could follow Washington's lead and prevent waste from entering their states — ending plans to dispose of some of Hanford's most radioactive waste off-site.

In November, with 69 percent of the voters in favor, Washington voters approved Initiative 297.

Before the initiative could take effect, the federal government requested a temporary restraining order to block it from becoming law. The federal government contended the initiative violated federal laws governing nuclear waste and interstate commerce.

Federal District Judge Alan McDonald granted a temporary restraining order. Washington state agreed to allow the injunction to carry into 2005 while issues of the initiative's constitutionality were resolved in court.

The Bush administration proposed a $2.07 billion budget for Hanford cleanup in fiscal year 2005. The budget was a $48 million increase over the budget estimate for fiscal year 2004. However, $64 million of that money could be used only on tank waste work when

"The only hope is to try to fight the initiative head on. Who has the resources to put up that kind of education program? I don't know. The burden falls on the Tri-Cities."

– Representative Jerome Delvin, Richland. (*Tri-City Herald*, January 30, 2004).

"The fundamental failure of I-297 is that while it tries to keep waste from coming into Washington state, it gambles all of Hanford's massive volumes of nuclear waste that other states won't do the same thing…It is deeply flawed and should be defeated."

– Washington Congressman Doc Hastings. (*Tri-City Herald,* August 26, 2004).

"We had hoped that the Department of Energy would try to work with the state instead of wasting money and effort fighting in court."

– Gerald Pollet, executive director of Heart of America Northwest. (Associated Press, December 1, 2004).

"The court finds the public interest favors the issuance of a temporary restraining order because of the need to continue current onsite clean-up activities at Hanford, unimpeded by an initiative, the scope and breadth of which is not fully ascertained at this juncture."

– From the Order Granting Motion for a Temporary Restraining Order. (December 2, 2004).

"If Congress, Washington and other states fail to stand firm, the administration will get away with its Alice in Wonderland plan to have Hanford considered clean because the Energy Department says it is."

– *Seattle Post-Intelligencer* Editorial Board, commenting on reclassification of high-level waste. (April 12, 2004).

"It's a very, very, very dangerous precedent. It leaves our state in jeopardy and it leaves all states with nuclear waste in jeopardy. But we're not done. This isn't over yet."

– Washington Senator Maria Cantwell. (*Tri-City Herald*, June 4, 2004).

legal issues concerning DOE's ability to reclassify high-level waste were resolved to DOE's satisfaction.

In March, Washington, Oregon, Idaho and three other states filed a friend-of-the-court brief which asked an appellate court to uphold a federal judge's ruling that DOE's internal processes for reclassifying high-level radioactive waste violated the Nuclear Waste Policy Act (NWPA). DOE had appealed the earlier ruling and said it would cause delays in cleaning up tank wastes at Hanford, Savannah River and the Idaho National Engineering and Environmental Laboratory.

The Senate Armed Services Committee added a rider to the $422 billion fiscal year 2005 Department of Defense authorization bill that allowed DOE to reclassify high-level waste at South Carolina's Savannah River Site and leave it on-site. The language was added at the request of DOE, which had been seeking a legislative fix after a 2003 federal court ruling went against the agency. DOE had been aiming to get the waste reclassification authority for all of its sites including Hanford, but opposition by Washington's Senators and Governor resulted in the rider focusing only on Savannah River. Washington Senator Maria Cantwell proposed an amendment to strip the language from the bill but it failed on a 48-48 vote after more than three hours of intense debate.

Former President Jimmy Carter weighed in on the issue and urged Congress to reject the plan to allow high-level waste to be left at the Savannah River Site.

Energy Assistant Secretary Roberson told a Senate hearing that DOE was not pursuing the authority to reclassify waste with the intent to leave large amounts of waste behind. She said DOE was committed to removing 99 percent of the nuclear waste in underground

The vitrification plant at the Savannah River Site. ▼

◄ *Workers in a Hanford tank farm.*

tanks at Hanford and other DOE sites, and that anything less was "off the table." Under questioning by members of the Senate Energy and Natural Resources Committee, including Oregon Senator Ron Wyden and Washington Senator Cantwell, Roberson said DOE would not go forward with draft plans to leave as much as 10 percent of the waste in the tanks.

In October, Congress approved language in the defense authorization bill to allow DOE to reclassify high-level waste both at the Savannah River Site and at the Idaho National Engineering and Environmental Laboratory. The provision did not cover the 53 million gallons of waste stored in tanks at Hanford.

In November, a federal appellate court reversed a federal district court ruling that a DOE Order to reclassify high-level radioactive waste violated the NWPA. A three judge panel of the Ninth U.S. Circuit Court of Appeals did not rule on the merits of the case but said it was too early to presume DOE would take actions in conflict with the NWPA. The court sent the case back to the lower court with directions to dismiss.

Worker safety issues — especially related to vapors from Hanford's underground waste storage tanks — were the focus of considerable attention. A September 2003 report issued by the Government Accountability Project (GAP) prompted an investigation by Washington Attorney General Christine Gregoire and other state agency representatives. Officials for CH2M Hill, which maintained the tank farms for DOE, said they had taken a number of steps to reduce the hazards since the GAP report was released.

▲ *Energy Assistant Secretary Jesse Roberson.*

"99 percent is what we're living by… I don't see any chance that we're going to go to (retrieving only) 90 percent."

– Energy Assistant Secretary Jesse Roberson, on how much waste DOE intends to try and retrieve from each of Hanford's waste storage tanks. (Associated Press, June 17, 2004).

"We are pleased that the conferees have adopted language that will allow the Department of Energy to move forward with safe and sensible environmental cleanup of nuclear waste storage tanks in South Carolina and Idaho."

– Energy Secretary Spencer Abraham. (DOE News Release, October 8, 2004).

"This back-room legislative fix would leave a legacy of radioactive contamination that could endanger drinking water for millions of Americans."

– Geoffrey Fettus, senior project attorney at the Natural Resources Defense Council. (Environmental News Service, October 13, 2004).

"There might be some danger in waiting, but that is not a greater hardship for (the plaintiffs in the case) and the rest of our society than the one already imposed by our high-level waste Frankenstein."

– From the ruling of a three judge panel of the Ninth U.S. Circuit Court of Appeals. (Associated Press, November 6, 2004).

▲ *Hanford Tank Farm workers.*

"This increase in exposures appears to indicate the actions being implemented are not sufficient and has elevated our concerns for the continued safety of tank farm workers."

– Letter from DOE Office of River Protection Manager Roy Schepens to CH2M Hill President Ed Aromi. (*Tri-City Herald,* March 30, 2004.)

"We are definitely erring on the side of caution."

– CH2M Hill spokeswoman Joy Turner, on new safety procedures for tank farm workers. (*Tri-City Herald*, April 21, 2004).

"The Department of Energy cannot credibly claim that worker safety at nuclear-waste cleanup sites is a top priority if it can't accurately track work-related injuries and illnesses."

– Washington Senator Maria Cantwell. (*Seattle Post-Intelligencer*, May 25, 2004.)

In late March, most work at Hanford's tank farms was halted after a number of workers reported exposures to vapors from the tanks.

Only essential workers were allowed in the tank farms and they were required to wear self-contained air tanks. CH2M Hill had previously banned the use of the devices as not necessary. There was also concern that the restricted visibility would cause workers to trip and fall. CH2M Hill expanded its monitoring of tank vapors. Air monitors were also installed at the vitrification plant construction site, about a quarter mile from the nearest tank farm, although no problems had been reported at that specific farm.

A preliminary investigation by the State of Washington concluded that because much was still not known about the vapors, existing monitoring done for worker protection might not be adequate. The investigation, conducted by several state agencies, also identified isolated problems with worker compensation claims.

DOE's Inspector General said Hanford contractors were underreporting the number of injuries and illnesses. Records maintained by Hanford's three largest contractors had large discrepancies when compared with the information provided to DOE. The Inspector General said that created a false image of safety and possibly masked threats to workers. Problems were also found at other DOE sites.

A report by the federal Office of Independent Oversight and Assessment found that not enough was known about the chemicals

in Hanford's underground tanks to conclude that tank farm workers had not been exposed to harmful vapors.

In October, 52 different chemicals were identified as posing potential risks to Hanford tank farm workers. CH2M Hill officials said safety measures required in the tank farms, including the use of air respirators, were sufficient to protect workers. The 52 chemicals were among more than 1,800 that either had been detected in vapors from the tanks or were suspected of being generated by the waste. Various chemicals were vented through filters into the air above the tanks.

Worker safety was emphasized at the waste treatment plant construction site when Bechtel National stopped work in June on both day and night shifts to emphasize its goal of zero accidents. The day was used to gather information from workers to improve the project's safety performance, which was well below the industry averages. The stop-work followed a series of near-miss accidents, including a 100-pound piece of steel falling 40 to 45 feet and landing about eight feet from a worker.

A Government Accountability Office (new name for the GAO as of July 2004), report said delays would likely continue in DOE's program to compensate workers who were harmed by exposures to chemical hazards at Hanford and other DOE sites. Since the program began accepting applications in July 2001 only one worker had been paid compensation. The GAO found some improvements in the program but predicted many workers would still have to wait years to receive compensation. DOE said it needed an additional $33 million in 2004 and $43 million in 2005 to speed processing of the severe backlog of these cases.

Workers at the Plutonium Finishing Plant (PFP) successfully completed the stabilization of all plutonium at the facility. About 2,250 triple-packed, stainless steel containers of plutonium would remain in PFP's vaults indefinitely. DOE hoped to eventually ship the plutonium to the Savannah River Site. Work began to transition to clean up and tear down the 61 buildings that made up the PFP complex.

DOE said waste retrieval efforts on tank C-106 were virtually complete. The tank was being used to demonstrate retrieval and closure. Less than an inch of granular solids remained in the bottom of the tank. Workers used a mild acid six times to dissolve sludge and sluiced the tank four times, aiming water nozzles at piles of sludge at the bottom of the tank.

Workers also completed the pumping of liquids from Hanford's single-shell tanks, meeting a federal court deadline to have all pumpable liquids removed from the tanks by September 30, 2004.

A new DOE Office of Science became the third DOE operation at Hanford. The Office of Science was in charge of Pacific Northwest National Laboratory and shared responsibility for the HAMMER training complex. Paul Kruger was selected as the manager.

"We underestimated the level of interest in the program and got off to a slow start."

– Tom Rollow, director of the Office of Worker Advocacy for DOE. (*Tri-City Herald,* April 22, 2004).

"What we mark today is a real turning point in Hanford history and the cleanup process."

– Keith Klein, DOE Richland Manager, on completion of plutonium stabilization. (*Tri-City Herald*, February 21, 2004.)

"We have shut the pumps off. We believe it's done."

– Steve Weigman, DOE's Office of River Protection, on the completion of moving pumpable liquids from all single-shell tanks. (*Tri-City Herald,* August 13, 2004).

"Through (your) efforts… you have ensured that these tanks no longer pose the threat of leaking liquid wastes that could threaten the environment and the Columbia River."

– Letter from Energy Secretary Spencer Abraham to DOE Office of River Protection Manager Roy Schepens and Hanford workers. (August 20, 2004).

"(The K-East) basin has leaked twice before. Moving the approximately two million pounds of fuel is the first step in emptying the basin altogether so that it no longer presents a risk to the environment."

– Keith Klein, DOE Richland Manager. (DOE News Release, July 1, 2004).

"Getting the fuel out of K-East was difficult work. Most of the fuel was badly corroded, and some of the fuel was literally falling apart as we retrieved it."

– Ron Gallagher, President and CEO of Fluor Hanford. (DOE News Release, July 1, 2004).

"This is in some respects a monumental achievement that we're talking about. This material, in the condition it was in, was available potentially to leak into the groundwater, into the soil under the basins."

– Nick Ceto, U.S. Environmental Protection Agency Hanford Project Manager, on getting all spent fuel out of the K-Basins. (*The Oregonian*, October 24, 2004).

"I believe EPA has been extremely patient…however, continued delay of remediation of the K-Basins is unacceptable to EPA…We believe DOE's proposed actions to delay completion of sludge removal from the K-Basins by nearly two years…demands that we set a firm deadline…"

– Letter from the U.S. Environmental Protection Agency's Michael Gearheard to DOE Richland Manager Keith Klein. (March 22, 2004).

The Hanford Advisory Board celebrated its tenth year of existence. The Board had issued 155 pieces of consensus advice to DOE, Ecology and EPA on policy issues related to Hanford cleanup.

The removal of spent nuclear fuel from the K-Basins was completed — eliminating a significant risk to workers and the public. The K-East basin was emptied by the first of July. The last canister of spent fuel was removed from the K-West basin in late October, completing the movement of 105,000 nuclear fuel rods to long-term storage at the Canister Storage Building in Hanford's 200 Area. Workers still needed to remove and treat about 50 cubic meters of radioactive sludge, drain the pools of water, and eventually remove the basins.

Progress on the sludge in the K-Basins was more difficult.

The Defense Nuclear Facilities Safety Board (DNFSB) said a DOE plan to begin removal of the sludge was not adequate. DOE contractors had planned to begin removal of the least contaminated sludge but the DNFSB said plans were still lacking for removal of the remaining sludge — which was much more contaminated. The start of the project was already 14 months behind schedule. DNFSB asked for a revised plan that included the disposition path for each sludge type and for any irradiated fuel or fuel fragments found in the sludge. DNFSB also wanted revised milestones for the completion of sludge removal from both basins.

After EPA warned that DOE would face additional fines up to $500,000 if it did not have an acceptable plan by May 1 to remove contaminated sludge from the K-Basins, EPA and DOE reached tentative agreement in April on a new schedule. Under the new plan, the sludge would be containerized beginning by October 2004. Complete removal of the K-Basins and their contents was required by March 31, 2009.

In June, work began to remove sludge from the K-East basin.

Sludge stirred up in one of the K-Basins. ►

◄ *DOE Richland Manager Keith Klein.*

In a letter to Flour Hanford, DOE-Richland Manager Keith Klein expressed concerns about the safety environment at the K-Basins, after a hoist rolled off the end of an overhead track system and crashed onto the steel grating above the spent fuel pool. Although no one was injured in the incident, Klein said the incident was just one of many issues that caused concern. Other events of concern during the past year included delayed notification to DOE, inadequate engineering processes, physical altercations between workers and misplaced equipment.

Fluor Hanford paid a $935,000 fine later in the year for multiple safety violations at the K-Basins. It was the largest penalty assessed by DOE against a Hanford contractor.

In October, Fluor Hanford notified DOE that it would not be able to meet a DOE commitment to the DNFSB to containerize the sludge in the K-East basin by the end of December.

In June, Hanford shipped its 100th truck of transuranic waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico. Nearly 3,000 drums of waste had been hauled away from Hanford in those 100 shipments. However, plans to eventually ship some of Hanford's other wastes to WIPP were opposed by the State of New Mexico.

The Director of New Mexico's Environment Department threatened to shut down WIPP if DOE persisted with its attempts to bring radioactive sludge to the site. The state also threatened to block a planned 2006 expansion of WIPP. New Mexico was opposed to bringing waste from Hanford's underground storage tanks that had previously been managed as high-level waste. DOE said a million gallons or more of Hanford's tank waste did fit the disposal criteria for WIPP and was no more hazardous than other waste that had been disposed there. Within days, New Mexico Governor Bill Richardson said he remained opposed to reclassification of high-level waste so that it could be sent to WIPP but said WIPP would not be closed down over this issue. In November, the State of New Mexico approved the permit modification, which banned any waste from WIPP that had ever been managed as high-level waste. If DOE could prove waste was never high-level waste, then New Mexico might be willing to modify the permit again to allow its disposal.

"(DOE) believes that these events may indicate a recurring breakdown of formality and discipline required to safely perform operations at K Basin."

– Letter from DOE Richland Manager Keith Klein to Fluor Hanford President Ron Gallagher. (March 12, 2004).

"This action gives New Mexico the clear authority to prevent any high-level sludge from coming to WIPP."

– Ron Curry, New Mexico Environment Department. (*Tri-City Herald,* November 4, 2004).

"This is about so much more than a fight over labels on drums. It is about promises that were made to the people of New Mexico when WIPP opened, and making sure those promises are kept."

– New Mexico Governor Bill Richardson. (*Tri-City Herald,* November 4, 2004).

"The U.S. Department of Energy must fund an injury assessment at the Hanford Site. It is the only way we can be certain the federal government can protect, restore or replace natural resources injured as a result of Hanford operations."

– Oregon Attorney General Hardy Myers. (State of Oregon News Release, July 8, 2004).

"We sent a little bit of waste out and got a lot of waste back. That's not how it's supposed to work."

– Ecology Spokeswoman Sheryl Hutchison. (*Tri-City Herald,* June 15, 2004).

"This penalty is a big, fat wake-up call…We need to see some immediate improvements to assure our citizens that the problems at Hanford are getting better, not worse."

– Ecology Director Linda Hoffman. (Ecology News Release, September 21, 2004).

"We have real issues with some of the statements Ecology has made."

– DOE Spokeswoman Colleen French. (*The Oregonian,* September 22, 2004).

EPA determined that 602 drums of transuranic waste sent from Hanford's PFP to WIPP before all the approvals were in place could stay there. No additional waste of that type could be sent until EPA approved procedures for determining the contents of the waste.

The States of Oregon and Washington announced their intent to sue DOE over its failure to assess natural resource injury at Hanford. The States' action came after DOE denied them access to a mediation between DOE and the Yakama Indian Nation, which filed suit in 2002 seeking restoration of natural resources harmed by Hanford's activities. The States' sought to force DOE to determine the extent of natural resource injury caused by decades of plutonium production for America's nuclear weapons program. The Confederated Tribes of the Umatilla Indian Reservation announced the same intent in September.

A federal appeals court rejected Nevada's arguments against building a high-level nuclear waste repository at Yucca Mountain. The court also rejected the government standard that the public would have to be protected from radiation leaks for only 10,000 years.

A Benton City man died after apparently falling while moving a surplus mobile office from Hanford's 200 Area.

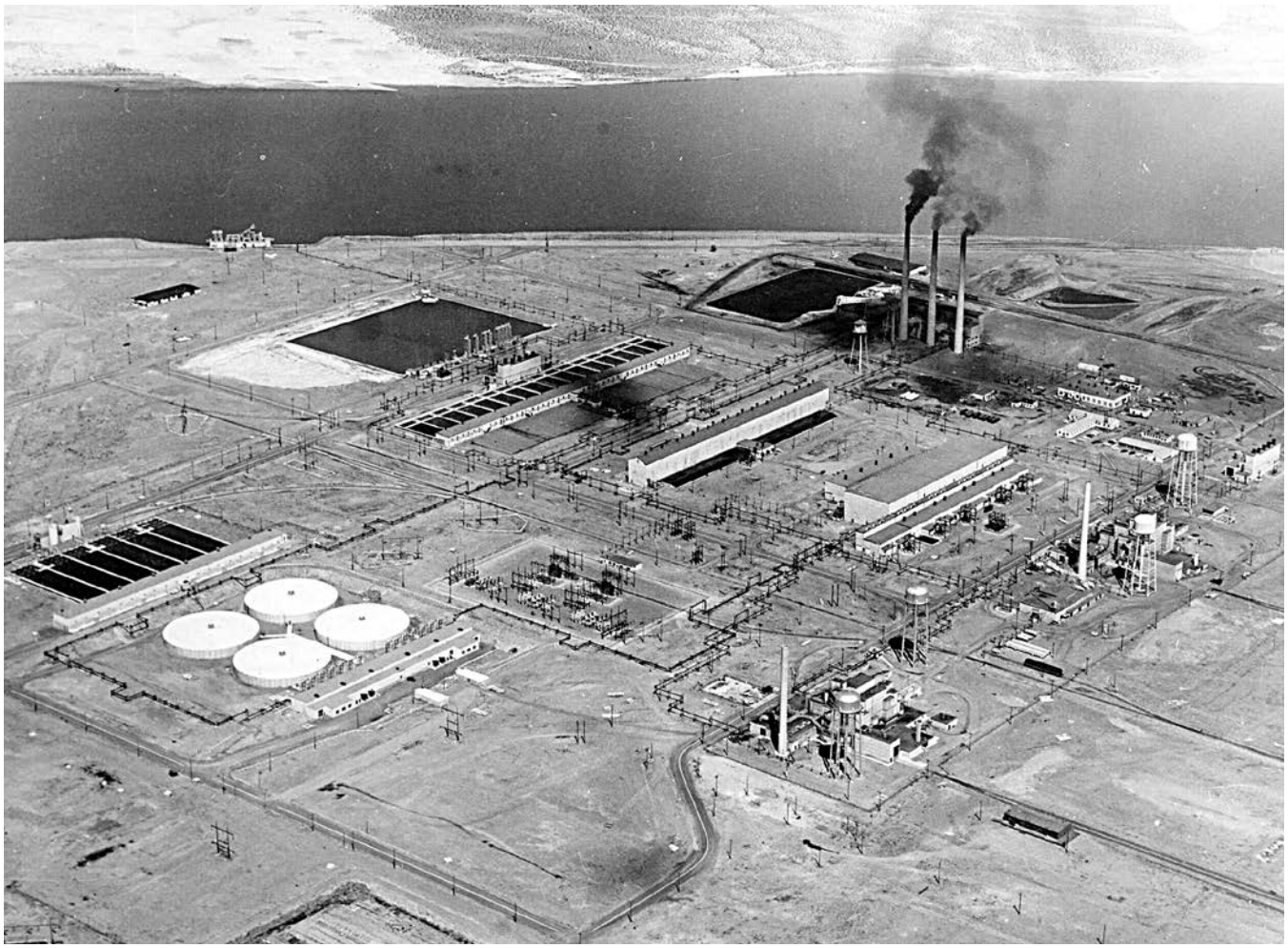
DOE's Office of Inspector General said groundwater cleanup programs at Hanford were largely ineffective yet the program remained in place. DOE operated pump-and-treat systems in Hanford's 100, 200 and 300 areas at a cost of about $8 million each year. The report suggested shutting down ineffective treatments and devoting more attention on developing more effective technologies. In a letter to the Office of Inspector General, the State of Oregon agreed that DOE had not met expectations or goals for remediating Hanford's groundwater but disagreed that the pump-and-treat systems had been largely ineffective.

In August, workers began draining sodium from the primary cooling loop of Hanford's Fast Flux Test Facility.

Ecology fined DOE $270,000 for violating the state's dangerous waste regulations. Ecology said DOE had been sending waste to Hanford from the Savannah River Site that should not have been brought to Hanford. Ecology also said the waste shipments were not properly documented and untrained personnel signed waste verification documents. Ecology's concerns centered on 83 drums of radioactive and hazardous waste that had been shipped to Hanford since 1997. DOE said Ecology was overreacting and trying to regulate activities for which they did not have authority.

Cocooning of the D Reactor was completed in September, three months ahead of a Tri-Party Agreement milestone.

President George Bush signed legislation requiring the National Park Service to study preserving Hanford's B Reactor as a museum. No funding had been authorized for the study.



▲ ***Hanford's D and DR Reactors (lower right of photo).***

There were two significant rulings on the Hanford downwinder litigation. A federal judge ruled that former Hanford contractors would not necessarily be able to avoid liability for possibly exposing downwinders to radioactive emissions. U.S. District Judge William Nielsen ruled that the five companies could not simply claim they were following government orders when they operated Hanford.

Judge Nielsen later ruled that making plutonium at Hanford in the mid-1940s was an "abnormally dangerous" activity which put thousands of Eastern Washington residents at risk. The ruling meant that downwinders would not have to prove that Hanford contractors acted recklessly to cause airborne releases of radioactive materials. The ruling affected a scheduled trial of 11 "bellwether" cases that could possibly determine an outcome for thousands of others who sued, alleging harm from radioactive material released from Hanford. The lawsuits were initially filed in 1990.

The final transfer of waste from the PFP complex to the tank farms was made. The transfer line was then capped — severing the final tie between Hanford's processing facilities and its tank farms.

"If the activity is abnormally dangerous, then the defendants may be held strictly liable for plaintiffs' damages, regardless of whether defendants exercised the utmost care in the conduct of their activities at Hanford."

– From the order of U.S. District Judge William Nielsen. (Associated Press, November 7, 2004).

"We believe this decision is fundamentally wrong and merits appeal. We still have years of litigation ahead of us."

– Kevin Van Wart, lead attorney for the Hanford contractors. (Associated Press, November 7, 2004).

Tank Waste Treatment

"We need the confidence of Congress to deliver $690 million (each year) through 2007."

– John Eschenberg, Waste Treatment Plant project manager for DOE's Office of River Protection. (*Tri-City Herald*, January 29, 2004).

"It all comes down to whose crystal ball is clearer. We've got our best estimate in there, and it'll come down to 2011 to see who's right."

– John Britton, Bechtel National, on cost estimates for Hanford's Waste Treatment Plant. (Associated Press, July 2, 2004).

Congress directed the U.S. Army Corps of Engineers to review escalating costs for constructing Hanford's vitrification facilities, called the Waste Treatment Plant (WTP). Construction costs were estimated at $4.35 billion before the contract was awarded in 2000. The current estimate was about $5.7 billion — a more than 30 per cent increase but still slightly under the amount allocated by Congress.

The Corps of Engineers study concluded there was a considerable risk that construction costs for Hanford's WTP would significantly increase. The report found that overall, cost estimates for the Hanford project were good but said not enough money had been set aside for construction contingencies or problems that might arise getting the plant up and running.

A GAO report said DOE had adopted a "high-risk" strategy as it moved forward with constructing its WTP complex. GAO staff said delays and cost overruns could more than quadruple the cost of the project.

In June, DOE awarded a $61 million contract to AMEC Earth

Aerial photo of the waste treatment complex in April 2004. ▼

and Environmental Inc., of London to build and operate a pilot facility to conduct full-scale tests of bulk vitrification using Hanford tank waste. Ecology approved a permit to allow DOE to treat up to 300,000 gallons of tank waste as a demonstration of the bulk vitrification technology. The waste would come from tank S-109.

By the end of summer, costs to demonstrate the viability of bulk vitrification rose to about $102 million.

DOE proposed to construct a new lined disposal facility in Hanford's 200 East Area, primarily to dispose of vitrified low activity waste from the WTP and the demonstration bulk vitrification system. The Integrated Disposal Facility could also be used to dispose of waste from other DOE sites.

DOE challenged an independent study which said there was a 50 percent chance of a major radiation or chemical accident during the 28 years that Hanford's WTP facilities would be operating. The study, by the Institute for Policy Studies, was published in a Princeton University peer review journal. According to the study, the worst hazard was from a steam explosion at one of the melters. The study cited a three year old Nuclear Regulatory Commission (NRC) study. But DOE officials said design changes made since the NRC study was conducted had dramatically reduced the risk of an accident and eliminated any possibility of a steam explosion.

In December, construction on Hanford's WTP facilities was slowed to ensure the design was adequate to withstand seismic forces. Recent studies indicated that sound waves caused by an earthquake could move much faster in Hanford's soils than was previously believed. Engineers were trying to determine if that would require the design standard to be raised.

"DOE's experience with glass melters does not inspire confidence. Since 1991 there have been at least eight melter-related accidents and failures at DOE sites, including two steam explosions."

– Bob Alvarez, Institute for Policy Studies. (New Scientist.com, July 25, 2004).

"There have been three years of designing and analyzing (to remedy) modes of failure. We have been able to design preventive systems to prevent an accident from occurring."

– John Eschenberg, WTP project manager for DOE's Office of River Protection. (*Tri-City Herald*, July 27, 2004).

Around the DOE Complex

There was strong criticism of DOE's nuclear security from two fronts. A "60 Minutes" report said security at DOE's nuclear weapons factories and research labs was inadequate. 60 Minutes quoted a DOE nuclear security specialist who said mock attacks on nuclear facilities were successful 50 per cent of the time. DOE officials said nuclear materials were secure but that they were working to improve security. Hanford was not mentioned in the report, which detailed security lapses at several sites such as Rocky Flats and Oak Ridge.

A General Accounting Office report said that while DOE had made significant improvements in physical security at its nuclear facilities since the September 11, 2001 terrorist attacks, they were not sufficient to ensure all DOE sites were adequately prepared to defend themselves against the higher terrorist threat now present. The report criticized DOE for taking two years to develop a design basis threat — a classified document that analyzed the potential capabilities of

"In the past we had determined that someone would have to get in and out (of a nuclear facility to do damage), and now we've determined that all they have to do is get in."

– Robin Nazzaro, General Accounting Office, at a House Committee hearing. (UPI, April 27, 2004).

"The people looking for soft spots would be ill-advised to come to the facilities for which I am responsible."

– Linton Brooks, Administrator of DOE's National Nuclear Security Administration. (UPI, April 27, 2004).

"I have been deeply disappointed in the lack of a cooperative approach the department has taken over the past several years on issues related to Hanford cleanup. It's unclear whether this unilateral approach was Ms. Roberson's design or those higher up in the administration."

– Washington Senator Patty Murray. (*Tri-City Herald,* June 16, 2004).

"Few have brought such an energy to the office, or worked so hard to make something happen… Roberson can rightfully claim that she leaves Hanford and other sites better off than she found them. And that's more than some assistant energy secretaries have been able to say."

– *Tri-City Herald* Editorial. (July 14, 2004).

terrorist forces that might attack nuclear sites. The report also said some DOE nuclear sites would not be able to meet the new security standards for up to several years.

Energy Assistant Secretary Jesse Roberson submitted her resignation, effective July 15. Roberson said she wanted to spend more time with her family. Roberson's top deputy, Paul Golan, was appointed Acting Assistant Secretary.

Energy Secretary Spencer Abraham tendered his resignation to President Bush in November. President Bush nominated Samuel Bodman, who had served as Deputy Secretary of the Treasury, as Energy Secretary.

"It fails to recognize that existing (and currently planned) Hanford cleanup decisions and goals are the result of 15 years of work, debate and compromise on the part of DOE, regulators, tribes, stakeholders and the public to achieve the most effective and protective cleanup within the limits of what is achievable and affordable."

– Letter from Ecology Nuclear Waste Program Manager Mike Wilson to DOE-Richland Manager Keith Klein and DOE-ORP Manager Roy Schepens about DOE's Risk-Based End States vision for Hanford. (February 23, 2004).

2005

"Does DOE believe that the (Waste Treatment Plant) project continues to be affordable?"

– One of the questions posed to the Government Accountability Office by Rep. David Hobson and Rep. Peter Visclosky after cost estimates for Hanford's Waste Treatment Plant began to approach $10 billion. (June 24, 2005).

The Cleanup

The slowdown of construction work at Hanford's Waste Treatment Plant (WTP) complex (page 137), coupled with rapidly escalating cost projections, generated serious concerns about the continued viability of the project. Otherwise, it was in many ways a typical year of Hanford cleanup – significant progress in some areas; litigation, funding shortages, and challenges in other areas.

The U.S. Department of Energy (DOE) spent a good portion of the year attempting to bring additional transuranic waste to Hanford from its Battelle Columbus site in Ohio. After resolving some legal hurdles, errors in an environmental study ultimately ended that effort.

DOE told Federal District Judge Alan McDonald in April that it had completed necessary environmental studies and should be allowed to resume waste shipments to Hanford. The State of Washington countered that the studies were inadequate and the shipments should continue to be banned. In May, Washington said it was willing to accept 37 cubic meters of transuranic waste from Battelle Columbus,

◄ *Ironworkers at Hanford's Waste Treatment Plant.*

"Our overall reaction to this is it is not a bad outcome for the state. The largest volumes of waste out there are still under injunction and cannot be shipped here."

– Sheryl Hutchinson, Washington Ecology spokeswoman. (Associated Press, May 13, 2005).

"The Department is very disappointed that Battelle's lack of appropriate quality assurance would allow such discrepancies to exist in the first place…the Department is immediately initiating an aggressive review of both the data in question and Battelle's quality assurance process."

– Charles Anderson, Principal Deputy Assistant Secretary of Energy for Environmental Management. (DOE News Release, July 22, 2005).

"I recently learned that there is some concern within DOE about 'regulatory uncertainty' over the Hanford cleanup due to various pending lawsuits, and that this may be a factor in the proposed budget cuts. I urge you to question this line of thinking…litigation has never stood in the way of continual progress at the site."

– Letter from Washington Governor Christine Gregoire to Energy Secretary Samuel Bodman. (April 20, 2005).

"We believe the proposed reductions go too far and will unnecessarily and unjustifiably delay cleanup progress… We urge you to reject the level of reductions proposed by DOE."

– Letter from Oregon and Washington House Members, on the proposed Hanford budget. (April 21, 2005).

so long as there were specific deadlines on getting the waste out of Hanford and a ban on importing other wastes to Hanford would be broadened. Judge McDonald ruled that Washington must allow some radioactive waste to come to Hanford from Battelle Columbus, but kept in place an injunction against importing a certain category of wastes. Judge McDonald also granted for 90 days Washington's motion to extend a preliminary injunction against bringing low-level and mixed low-level waste to Hanford.

In July, Battelle Pacific Northwest National Laboratory discovered errors in the final Hanford Solid Waste Environmental Impact Statement that could impact conclusions about possible effects on Hanford groundwater from past and future waste disposal activities at the site. The errors were discovered while information was being gathered to respond to document requests by the State of Washington as part of their litigation against DOE. DOE notified the federal court of the error and told the judge that as a result, a ban on sending low-level radioactive waste to Hanford should remain in place for the time being. DOE also postponed planned shipments of transuranic waste from Ohio to Hanford, even though the analysis problems did not directly impact the planned storage of the transuranic waste.

By October, DOE announced the Battelle Columbus waste would be taken at least temporarily to the Savannah River Site in South Carolina instead of to Hanford.

DOE's Inspector General said hundreds of unused groundwater monitoring wells at Hanford were not being properly decommissioned. That could result in additional spread of contaminants to the groundwater. Hanford officials said they did meet targets for decommissioning wells in 2004 but admitted there was room for improvement. An estimated 7,000 monitoring wells had been drilled at Hanford.

The Bush Administration proposed a $267 million cut in Hanford funding for fiscal year 2006 — a cut of about 12 percent. An additional $30 million would go to increased security costs. Proposed cuts included a 10 percent cut in funding for construction of Hanford's WTP facilities.

In April, all 14 Washington and Oregon U.S. House Members requested nearly $240 million be restored to the Hanford budget in fiscal year 2006. In a letter to the chair and ranking member of the House Subcommittee on Energy and Water Development Committee on Appropriations, the House Members noted that proposed budget cuts would severely impact progress at Hanford.

The Washington and Oregon delegations were not successful and the fiscal year 2006 budget was signed by President Bush at year's end, cutting Hanford funding by about $315 million when compared to the previous year's budget. Funding for the WTP was cut by $164 million.

An attempt to further reduce the WTP construction budget by $100 million to help pay for hurricane Katrina relief was eventually unsuccessful. The White House proposed $2.3 billion in cuts from a variety

of programs that it called "unnecessary spending."

The Defense Nuclear Facilities Safety Board (DNFSB) said a lack of trained personnel and inadequate criticality safety procedures was a concern in Hanford's Plutonium Finishing Plant (PFP). Work to stabilize more than 19 tons of plutonium bearing materials was completed in 2004, but cleanup work continued with plutonium contaminated glove boxes and other equipment. Failure to follow proper criticality safety procedures could result in dangerous radiation exposure to workers.

In July, PFP workers beat a Tri-Party Agreement milestone by more than a year to remove plutonium from processing systems and equipment. The plutonium was cleaned from glove boxes, equipment, and processing ventilation systems.

Technetium 99 was detected beneath the T Tank farm in Hanford's 200 West Area. Preliminary samples from a new groundwater monitoring well showed fairly high readings.

DOE submitted to the DNFSB a revised schedule for vacuuming sludge from the K-Basins after Fluor Hanford missed a related Tri-Party Agreement milestone. The plan had few technical changes but allowed far more time to complete the work. DOE proposed to have the sludge in the K-East basin vacuumed into containers by October 2006. DOE had previously committed to having that work completed by the end of 2004. Sludge in the K-West basin would be vacuumed into containers by July 2007. All the sludge would be removed from the underwater containers and packaged for disposal by November 2009.

There was concern that the K-East basin had a new leak when two large cracks were discovered. The K-East basin had two major leaks in the past — leaking several million gallons of radioactively contaminated water on each occasion. It was later determined that the cracks did not extend all the way through the 27-inch thick concrete wall.

The National Academy of Sciences released two reports dealing with waste cleanup at DOE sites. One report recommended that some transuranic and high-level wastes could be left at Hanford and other DOE sites rather than sent to deep underground geologic repositories. The report recommended a six-step decision-making process based on risk and other factors before a decision was made to exempt waste from deep geologic disposal. The report also recommended the process be subject to independent outside technical review and approval or denial be in the hands of a separate federal agency such as the Environmental Protection Agency (EPA) or Nuclear Regulatory Commission. The second report suggested DOE should consider extending the life of waste treatment facilities at Hanford and other DOE sites. The report said they could potentially be used to treat waste from other sites.

DOE awarded a seven year, $1.9 billion contract to complete cleanup along Hanford's Columbia River corridor. The winning bid was submitted by a group that included Washington Group International, Bechtel National, and CH2M Hill. A previous bid award for similar work was successfully protested. The contract

"Every American can appreciate the need to prioritize federal spending to pay for hurricane recovery, but it's a total outrage for Hanford cleanup funding to be labeled 'unnecessary'."

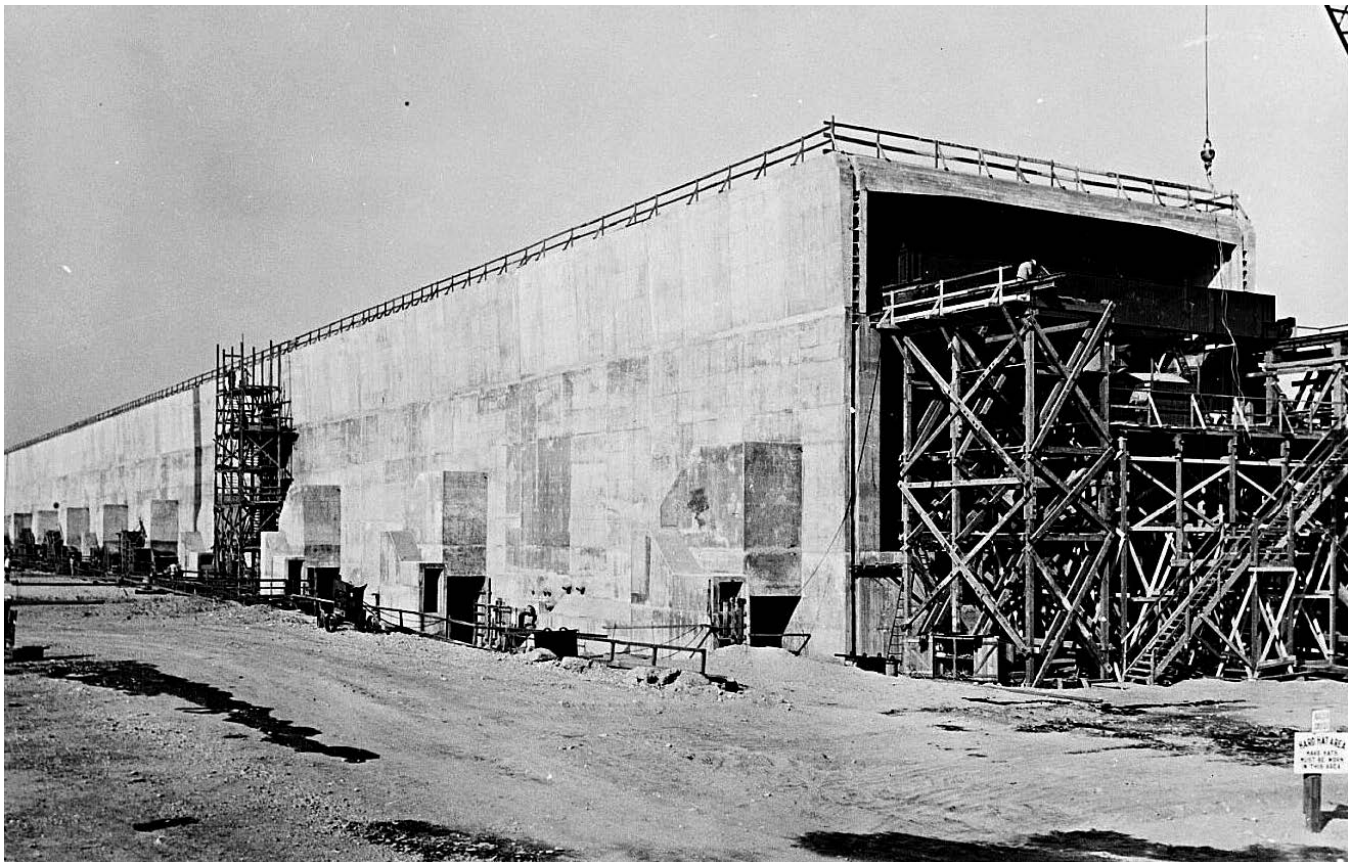
– Statement from Washington Congressman Doc Hastings. (October 28, 2005).

"The devastation caused by hurricanes in the Gulf caused the government as a whole to take a hard look at budgets and make some very difficult funding decisions."

– Mike Waldron, DOE spokesman. (*Tri-City Herald*, October 29, 2005).

"There is nothing fiscally responsible about the administration's efforts to rob-Peter-to-pay-Paul attempts at Katrina recovery. If the President were serious about fiscal responsibility, he would rethink a short-sighted and dangerous tax cut policy."

– Statement from Washington Senators Patty Murray and Maria Cantwell. (October 31, 2005).



▲ ***Hanford's U-Plant nearing completion in 1944.***

"Ultimately, we arrived at a remedy compliant with regulations, protective of human health and the environment, and that makes sense from a technical implementation standpoint."

– Nick Ceto, U.S. Environmental Protection Agency's Hanford Project Manager, on plans to demolish U Plant. (DOE News Release, October 4, 2005).

"We'll be watching the work at Hanford and using the lessons learned to inform our decisions on the other canyons across the country."

– James Rispoli, DOE Assistant Secretary for Environmental Management. (DOE News Release, October 4, 2005).

included incentives to complete the cleanup work by 2012 — three years earlier than the schedule. The contract award was protested again but later withdrawn.

DOE and EPA signed a Record of Decision for Hanford's U Plant and surrounding waste sites. U Plant was the first of Hanford's "canyon" facilities to have a cleanup plan in place. It was also the first formal agreement at Hanford that included leaving some waste in place. U Plant was 800 feet long, 70 feet wide and 80 feet high, with more than 30 feet underground. While some waste would be removed from the canyon and disposed in both on-site and off-site disposal facilities, contaminated equipment would be consolidated into the below-ground cells. Grout would be used to fill the empty spaces and hold the contamination in place. The U Plant roof and wall sections would be collapsed and an engineered barrier would be constructed over the top of the canyon building — rising as much as 40 feet high.

Hanford workers made progress in retrieving waste from several underground storage tanks. In March, Hanford workers completed work to empty their second tank. They demonstrated a vacuum system to remove about 3,000 gallons of sludge from tank C-203, a 55,000 gallon tank. Less than 100 gallons of waste remained in the bottom of the tank and stuck to its walls, well within the amount allowed by the Tri-Party Agreement.

By August, work was complete in emptying a third Hanford tank.

Workers again used a vacuum hose to suck sludge and saltcake out of tank C-202, which was a suspected leaker. A high-pressure spray of water was also used to break up clumps of waste that could not be vacuumed. The process took about six weeks, far quicker than the nine months it took to empty the previous tank. About 20 cubic feet of waste was still in the tank — under the limit allowed by the Tri-Party Agreement.

Despite that progress, DOE's Office of Inspector General said DOE might have difficulty meeting a 2018 Tri-Party Agreement milestone to remove waste from all 149 single-shell tanks. An audit found that DOE would not meet a September 2006 Tri-Party Agreement milestone to retrieve waste from the 16 tanks in the C Tank farm. That delay, along with escalating costs to conduct the work, would likely put the 2018 milestone in jeopardy.

In November, workers began to remove 71,000 gallons of sludge from tank C-103, the seventh Hanford tank to undergo waste retrieval efforts. Since the tank was not believed to have leaked, workers used a hydraulic spray to dissolve the sludge so it could be pumped from the tank. Rather than adding new water to the tank system, Hanford workers used liquid waste from the double-shell tanks in the hydraulic spray.

The first verdict in Hanford "downwinder" litigation was split. Two people who claimed radiation releases in the 1940s from Hanford caused their thyroid cancer won their cases in federal court; but a jury ruled against three others and hung on a sixth case. After more than a decade since litigation was initially filed against companies that built and operated Hanford in its early years, the results of the three-week long trial led both sides to claim victory. Attorneys for the companies said the six people represented the strongest cases the plaintiffs had and they were able to win just two and gain awards of less than it cost to bring the case to trial ($227,508 and $317,251). Plaintiff's attorneys said it was a historic ruling because the jury was convinced that Hanford operations caused harm to some people. Several thousand other people had similar claims.

Questions regarding implementation of nuclear waste Initiative 297 were referred to the Washington Supreme Court. The questions included whether the initiative, passed by voters in November 2004 but not enforced due to a Federal District Court ruling, banned movement of waste already at Hanford.

Oral arguments were heard in May. DOE claimed the initiative dramatically expanded the state's authority to regulate nuclear waste, beyond what was allowed by federal law. The State of Washington contended the initiative did not attempt to expand the state's authority, it merely instructed the state to more vigorously use its existing authority to block waste shipments from coming to Hanford until the site met environmental standards.

The Washington Supreme Court ruled in July that Initiative 297 would not necessarily be invalidated if portions of the law were ruled unconstitutional. The court did not determine — and was not asked

"The tanks are the most important cleanup project at Hanford. There's no greater need. So every one they get emptied is a big step forward."

– Sheryl Hutchison, Washington Ecology spokeswoman. (Associated Press, August 16, 2005).

"From nine months to six weeks is a major accomplishment for us, and really demonstrates our learning in the process and our operation getting much more efficient at how to operate this vacuum system."

– Ryan Dodd, CH2M Hill. (Associated Press, August 16, 2005).

"We examined the path forward for completion of retrieval activities in the C Farm and we were not encouraged by the likelihood of meeting Departmental schedule or cost goals."

– DOE Office of Inspector General. (DOE/IG-0706, October 17, 2005).

to determine — whether portions of the law were unconstitutional.

The U.S. Department of Justice asked Judge McDonald to strike down the entire initiative as unconstitutional. The Department of Justice contended the initiative interfered with national plans for nuclear waste cleanup; disrupted national security research; and undermined the Navy's ability to maintain and decommission nuclear submarines.

Workers drilled through the core of Hanford's Fast Flux Test Facility in May to remove the last of the liquid sodium from the reactor.

A committee report on a U.S. House appropriations bill suggested Hanford and other DOE sites be considered to store spent nuclear fuel from commercial nuclear power plants. Given continuing delays with the Yucca Mountain project, the report urged DOE to aggressively move to take title to commercial spent fuel and consolidate it for storage at DOE facilities such as Hanford. Closed military bases could also be considered.

Energy Secretary Samuel Bodman visited Hanford in June. Bodman met with Washington Governor Christine Gregoire, addressed DOE employees, and toured much of the site.

A health study of Hanford workers indicated that older workers exposed to low levels of radiation may have had an increased chance of dying from cancer. The increase was not evident in workers under the age of 55 who were exposed to similar amounts of radiation. The study found that cancer death rates for workers 55 or older increased an average of three per cent for each additional rem of radiation they received. Incidences of lung cancer increased at a greater rate. The study included more than 26,000 Hanford workers hired between 1944 and 1978. Study authors speculated that older workers might be more sensitive to radiation because age brought declines in immune function and the ability to repair genetic damage. They also said more research was needed.

An independent council was established to address employee health concerns in Hanford's tank farms. CH2M Hill Hanford Group agreed to implement consensus recommendations from the Hanford Concerns Council, so long as they did not violate legal or contractual obligations. The ten member council included three advocates for worker concerns, three CH2M Hill representatives, and three neutral members. It was led by Jonathan Brock, a University of Washington professor.

The Government Accountability Office (GAO) said Hanford cleanup could be threatened by DOE's inability to consolidate plutonium at the Savannah River Site. Accelerated cleanup plans at Hanford called for excess plutonium to be shipped to Savannah River by September 2006. But Savannah River did not have facilities available to store Hanford's plutonium. Demolition of Hanford's PFP could also not move forward until the plutonium had been moved out of the facility.

▲ ***Energy Secretary Samuel Bodman at Hanford.***

"We think it raises some interesting questions…Because the predictions from the (atomic bomb studies) said we shouldn't find anything, the finding is important and a reason for concern."

– Steven Wing, associate professor of epidemiology at the University of North Carolina at Chapel Hill and a study co-author, on a health study of Hanford workers. (*Tri-City Herald,* June 21, 2005).

"Because it is unable to consolidate its plutonium, DOE faces additional costs in excess of $85 million annually to securely store plutonium at its current locations, and its cleanup goals for Hanford are in jeopardy."

– Government Accountability Office Report GAO-05-665. (July 20, 2005).

DOE announced completion of two major Tri-Party Agreement milestones, one more than five months early. Workers completed the retrieval of more than 13,500 drums of suspect transuranic waste from Hanford's burial grounds and completed an 11-year effort to upgrade infrastructure of the double-shell tank system. Among the upgrades was the installation of 14 miles of new transfer lines between the 200 East and West areas and 6,600 feet of new transfer lines to deliver waste to the WTP complex.

An "Alert" level emergency was declared in August after a waste drum ruptured and suspected contamination leaked out. Areas in the vicinity of the waste disposal trench were evacuated for a few hours. There was no radioactive material leak and no one was contaminated. DOE also declared an Alert level emergency in November after a small chemical explosion at a building near the Fast Flux Test Facility. There were no injuries.

Cocooning of H Reactor was completed in October.

"Pulling these containers out of the trenches eliminates the threat they pose to the surrounding environment and allows us to make an increasing number of shipments of transuranic waste out of Washington State for disposal."

– Keith Klein, DOE Richland Manager. (DOE News Release, August 17, 2005).

Tank Waste Treatment

Major construction work at Hanford's WTP complex was dramatically reduced after it was determined that seismic design standards needed to be increased by 38 percent. Construction work was slowed in December 2004 when new studies indicated that the upper levels of the buildings would sway more in an earthquake than originally predicted.

DOE officials indicated that they did not anticipate that major changes would need to be made to work that was already completed. Overall, construction of the facilities was about 35 percent complete.

By the end of the year, DOE determined it would be necessary to stop construction work on key parts of Hanford's WTP until design work could be completed. Construction on the pre-treatment plant and the high-level vitrification plant was suspended, although work on the low-activity waste treatment plant, the analytical laboratory, and the balance of facilities continued. DOE officials said they were committed to completing the facilities.

DOE Headquarters and Congress took actions to more actively oversee the project. Charles Anderson, DOE's principal deputy assistant secretary for environmental management, directed that all current and future project work authorizations related to the WTP must receive his approval in writing. Congress added a requirement to Hanford's 2006 budget that required DOE to regularly report on the status of the WTP. Quarterly reports to the House and Senate Committee on Appropriations were due beginning January 1. The new requirements were added after Energy Secretary Bodman told Congress to expects costs associated with the WTP to rise more than 25 percent above the $5.8 billion budget. The conference committee

"I will take whatever steps are necessary now — call it an investment — to ensure this plant does everything we need it to do when we begin radioactive operations."

– Roy Schepens, DOE Office of River Protection Manager. (*Tri-City Herald,* February 25, 2005).

"What we are not going to do is to do anything hasty. We are going to do things deliberately and with common sense."

– Bruce Carnes, DOE Associate Deputy Secretary. (*Tri-City Herald*, June 29, 2005).

"While the department's announcement today is discouraging, I am pleased that the Department of Energy plans to continue construction on the low-level waste facility and the laboratory. That indicates they are committed to the treatment complex over the long-term and are not attempting to abandon it."

– Washington Governor Christine Gregoire. (*Tri-City Herald*, June 29, 2005).

▲ *The Waste Treatment Plant's Low-Activity Waste Vitrification facility, December 2005.*

"The White House and Energy Department say they support this project, but the Vit Plant was the only Energy Department project targeted for cuts in the President's supplemental (budget) two weeks ago. Actions speak louder than words."

– Washington Senator Patty Murray. (Office of Senator Murray News Release, November 14, 2005).

"Over half a billion dollars still represents a sizable investment and interest in the construction of the waste treatment plant."

– DOE spokesman Mike Waldron. (Associated Press, November 14, 2005).

report also referenced an Army Corps of Engineer study on the project — which DOE had not yet released — and indicated the costs could escalate to as much as $9.3 billion. DOE was also required to report on "actions taken to rectify the management failures" at the WTP.

In September, DOE officials advised the State of Washington that it might miss the 2011 Tri-Party Agreement milestone to begin full operation of Hanford's WTP facilities. DOE said it would not commit to a new schedule or budget until it could make certain it was valid.

The DNFSB said DOE was successfully resolving safety issues at Hanford's WTP and there was no reason not to move forward with design and construction work. In a status report to Energy Secretary Bodman, the Board said DOE was responding to safety issues and was proposing technically sound solutions to identified concerns.

Washington State officials vowed to do whatever was necessary to ensure continued progress on Hanford cleanup and completion of the vitrification facilities. Governor Gregoire called on President Bush and Energy Secretary Bodman to get Hanford cleanup "back on track."

A House appropriations subcommittee requested the GAO review the cost and schedule of building Hanford's WTP facilities. The request implied that new cost estimates could approach $10 billion and result in delays of four years. The Corps of Engineers, at DOE's request, was already reviewing the cost and schedule estimates.

In December, DOE released an edited version of the Army Corps of Engineers study of Hanford's WTP construction project. The Seattle Times earlier reported that it might take four additional years and an extra $4 billion to complete Hanford's vitrification facilities. The report was leaked to the Times, which had sought to obtain the report for months through public records laws. The cost increases and delays meant the facilities might not be operational until 2015, at a cost of $9.65 billion. DOE resisted releasing the report, saying that the information the Corps used in developing the report was not complete enough to fully verify cost and schedule implications. DOE did not want to commit to new cost and schedule estimates until it had more confidence they could meet them.

The latest full-scale test of bulk vitrification was terminated after completing the addition of only five of the planned eight loads of simulated waste. The test was stopped after there were indications that corrective maintenance would be required before all eight loads of waste simulant were added. Small puffs of smoke were also seen near the melter seals when the vacuum within the melter was lost.

Cost estimates for the bulk vitrification demonstration project at Hanford meanwhile grew to $160 million — nearly four times the original estimate from three years earlier. Construction was halted as the increased costs and concerns by the DNFSB were assessed.

DOE's Inspector General said DOE should have gotten approval by the State of New Mexico before beginning a project to send Hanford tank waste to an underground waste repository in that state. The Inspector General report said the project had the potential to save taxpayers nearly half a billion dollars but that DOE should not have spent money preparing the waste until New Mexico approved a permit.

Construction of the Integrated Disposal Facility — which was intended for disposal of vitrified low activity tank waste and other waste — was mostly completed. The disposal trench was 1,500 feet wide by 765 long by 42 feet deep, with the possibility of future expansion if needed.

"It seems to me that the U.S. Department of Energy has exercised an excessive amount of secrecy regarding a public report prepared by a public agency on the work at a federal project site."

– Ecology Director Jay Manning. (*Tri-City Herald*, December 7, 2005).

"The Department of Energy's refusal to release a 7-month-old study on cost overruns at Hanford's vitrification plant was always foolish, but now it's turned downright ridiculous. Its major findings — that projected costs might jump from $5.8 billion to nearly $10 billion and that construction could take four years longer than expected — were divulged months ago…With so many embarrassing results, some skeptics are certain to see a cover-up in DOE's attempts to keep the study from reaching the public. More likely, it's bad judgment, not bad intentions."

– *Tri-City Herald* Editorial. (December 6, 2005).

Around the DOE Complex

The GAO said DOE's goal of saving $50 billion by accelerated cleanup at DOE sites was likely not attainable. DOE announced the plan in 2002 — hoping to shorten cleanup by 35 years. While the GAO had found progress and some cleanup programs were ahead of schedule, plans to treat and dispose of high-level waste in tanks at Hanford and other sites had fallen behind schedule. These projects were among the most expensive and where DOE announced the biggest potential cost reductions. The GAO also questioned whether it was realistic to expect almost 30 percent less costs because of new technology

"DOE's method of calculating its $50 billion cost reduction likely overstated the potential reductions… key sites are already experiencing delays, and by the end of fiscal year 2004, had incurred cost increases."

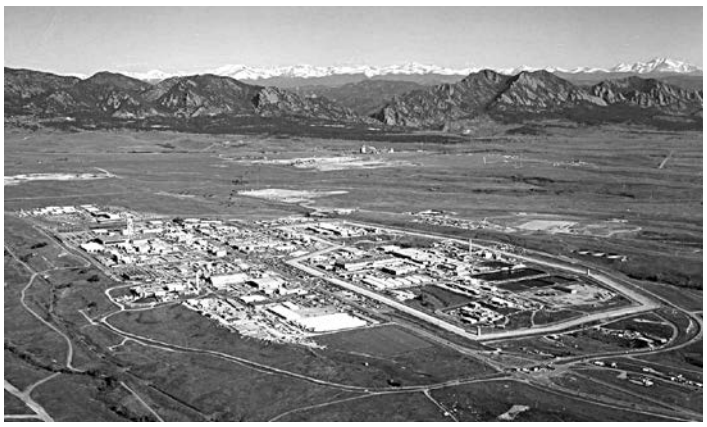
– Government Accountability Office Report GAO-05-764. (July 29, 2005).

development. Continued delays in opening a national high-level waste repository at Yucca Mountain also resulted in significant extra costs at Hanford and other sites.

The GAO also said security of weapons-grade plutonium at Hanford and other DOE sites was generally good, but questioned whether DOE would meet a 2008 deadline to incorporate additional security improvements based on increased threats. Additional security at DOE sites would cost up to $584 million extra during the next several years. The GAO recommended that DOE consolidate the material at fewer sites and also turn its security force into an elite force, comparable to the U.S. military's Special Forces.

The U.S. Senate confirmed Samuel Bodman as Secretary of Energy in February and James Rispoli as the Assistant Secretary of Energy for Environmental Management in August.

The $7 billion cleanup at the Rocky Flats Site near Denver was completed. The U.S. Fish and Wildlife Service planned to use a portion of the 6,240-acre site as a refuge that could open by 2008. The spots where contamination was the worst would remain off-limits.



▲ ***Rocky Flats — before and after cleanup.***

"We will be regarded by those with whom we work and serve, and by the regulatory agencies that represent the public, as an organization of people that meets its commitments, is credible, and has leadership, management, staff and workers who are well prepared to perform the tasks at hand."

– Message from newly confirmed DOE Assistant Secretary Jim Rispoli to DOE and contractor staff. (August 10, 2005).

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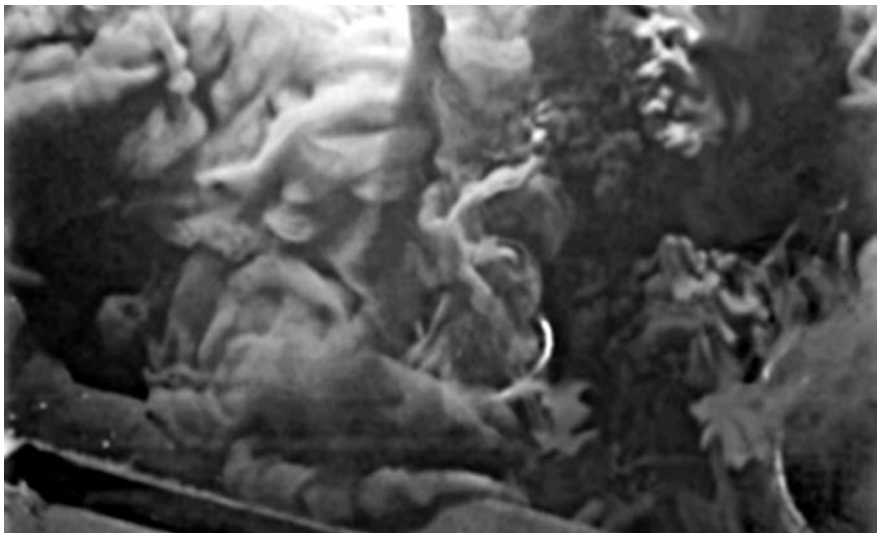
"The state and others are not pleased with the selection of Hanford as a disposal facility…The fact is, however, that the federal government is entitled to make the selection... Decisions which need to be made at the national level addressing national concerns cannot be trumped by protectionist regulations enacted by individual states."

– Opinion of Federal District Judge Alan McDonald, in striking down a Washington state initiative. (June 12, 2006).

The Cleanup

Continuing cost escalations and schedule slips for Hanford's Waste Treatment Plant (WTP) complex (page 147) prompted new scrutiny of the project. Elsewhere on the site, work on a new massive environmental study began; an initiative that would have prevented waste from coming to the site was ruled unconstitutional; and waste was successfully removed from three of Hanford's older tanks.

The Defense Nuclear Facilities Safety Board endorsed a new schedule for cleaning up sludge in the K-Basins. All the sludge would be removed from the underwater containers and packaged for disposal by November 2009. The U.S. Environmental Protection Agency (EPA) also agreed to the revised schedule and adjusted milestones in the Tri-Party Agreement.



◀ ***K-Basins sludge continued to challenge Hanford workers.***

"The Board remains concerned that difficulties with design, engineering, and project management may continue to delay the (sludge) project. Although a number of corrective actions have been taken in the past year to address these problematic areas, little substantial evidence exists to indicate that the project is now healthy in these areas."

– Letter from A.J. Eggenberger, chairman of the Defense Nuclear Facilities Safety Board, to Energy Secretary Samuel Bodman. (January 5, 2006).

"We're not happy with the delay, but this is where we are. This is the reality."

– Larry Gadbois, U.S. Environmental Protection Agency. (*Tri-City Herald,* January 12, 2006).

Hanford's H Area in 1948, before the reactor was constructed. ►

"The conditions in the K-East Basin and the characteristics of the sludge presented a formidable challenge…Project staff, workers and engineers worked side-by-side to adapt to changing conditions to finish this challenging project."

– Pete Knollmeyer, Fluor Hanford Vice President. (DOE News Release, October 16, 2006).

"With this agreement, both parties will be able to shift their focus and resources away from litigation and toward partnership and our shared cleanup goals. The settlement of this lawsuit signals a new day in our cleanup efforts, where both the Federal government and the State jointly address Hanford's cleanup challenges and seek common ground and quality solutions."

– Energy Secretary Samuel Bodman. (DOE News Release, January 9, 2006).

"Had we not filed this suit, the Department of Energy would have gone ahead and disposed of radioactive and hazardous waste based on an environmental analysis that all sides now agree is not trustworthy."

– Washington Attorney General Rob McKenna. (State of Washington News Release, January 9, 2006).

"Our commitment to the waste treatment plant is not purely rhetorical, but practical and real. We're putting our money where our mouth is."

– DOE spokesman Mike Waldron. (Associated Press, February 6, 2006).

Hanford workers began pumping sludge from the K-East basin in October. The sludge was being pumped 2,500 feet to the K-West basin to be stored until a treatment system was built. Removal of the sludge was expected to take about five months. Once the sludge had been removed the water would be drained, the basin demolished, and contaminated soil underneath the basin removed.

The U.S. Department of Energy (DOE) and the State of Washington reached a settlement agreement to dismiss litigation filed by Washington challenging the Hanford Solid Waste Environmental Impact Statement (EIS). As part of the settlement agreement DOE agreed to prepare a new expanded EIS with Washington as a cooperating agency. The new EIS would include an updated site-wide groundwater analysis. Washington had initially filed the litigation in 2003 to block shipments of transuranic waste from being brought to Hanford. The state amended the suit in 2004 to cover other waste types, contending that DOE had not done a thorough environmental analysis of the impacts of waste disposal at Hanford, particularly as it would impact groundwater. DOE also promised to hold off on most waste shipments to Hanford until the EIS was completed, which was expected sometime in 2008.

The Bush Administration's proposed fiscal year 2007 budget increased funding at Hanford and restored construction funding for the WTP to $690 million. Hanford would receive $1.88 billion for cleanup and security costs — a significant increase from the fiscal year 2006 funding of $1.75 billion, but still well below the previous year's funding of $2.09 billion. Cleanup along the Columbia River corridor would be among the Hanford projects receiving additional funds but funds would be reduced for tank waste retrieval and cleanup work at the Plutonium Finishing Plant. Construction would also be delayed on the bulk vitrification pilot plant.

A Colorado company, S.M. Stoller Corp., was awarded a $22 million subcontract to operate Hanford's Environmental Restoration Disposal Facility. Stoller operated a similar disposal site for mixed radioactive waste at the Idaho National Laboratory.

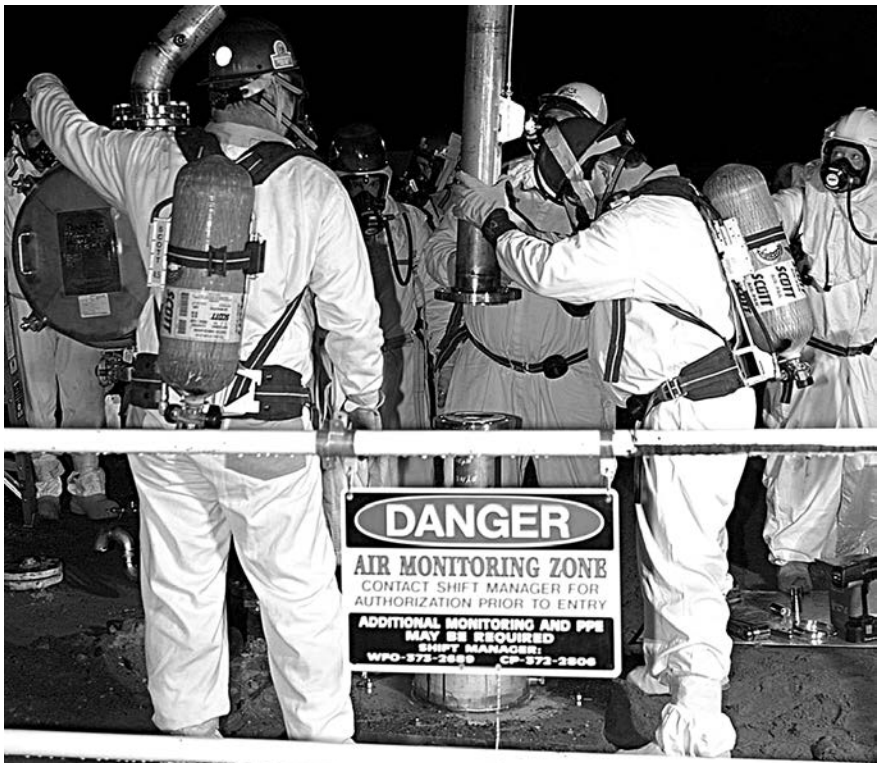
The State of Washington and Nez Perce tribe joined a Yakama Indian Nation lawsuit which sought to force DOE to conduct a Natural Resource injury assessment or have DOE compensate the state and tribes for costs they incurred in doing such an assessment. The Yakama Nation filed the lawsuit in 2002 and the case had been in mediation much of the time since the initial filing. The State of Oregon joined the litigation later in the year.

In December, the Yakama Nation informed DOE that it would complete its own natural resource damage assessment at Hanford. DOE's position was that it was too early in the process to conduct damage assessment and that it should occur after cleanup was mostly complete. The Yakama countered that a damage assessment would provide useful information to improve cleanup.

Hanford workers completed waste retrieval from three single-shell tanks during the year — bringing the total to six tanks emptied — but were unable to meet a Tri-Party Agreement milestone to remove waste from all 16 of the tanks in the C Tank farm. DOE said the process took longer than planned in part because they were forced to develop new technologies as they went along.

Two of the tanks emptied were smaller, 55,000 gallon tanks. C-201 was completed in March and C-204 was completed in December. In October, Hanford workers completed removal of waste from tank C-103, a 530,000 gallon tank. Waste retrieval operations continued at two other tanks and had just begun at a third tank.

Respiratory protection requirements were eased in Hanford's tank farms. Because some of Hanford's underground waste storage tanks vented chemical vapors into the atmosphere, workers and the Government Accountability Project raised concerns more than two



◄ *Workers in a Hanford tank farm.*

"We have waited for decades for the federal government to fix our natural resources they injured. Now the Yakama Nation itself has decided to assess the full extent of the injuries caused by the Hanford pollution."

– Philip "Bing" Olney, chair of the Yakama Nation General Council. (*Tri-City Herald,* December 17, 2006).

"We're glad to see another tank emptied. We're moving in the right direction."

– Laura Cusack, Washington Department of Ecology. (*Tri-City Herald,* March 29, 2006).

"Each time we empty a single-shell tank we achieve additional protection of the environment and this should be celebrated. When cleanup began, many doubted that waste retrieval was possible due to the scores of obstacles we faced."

– CH2M Hill President and CEO Mark Spears. (DOE News Release, December 19, 2006).

years prior about possible long-term health effects from breathing the tank vapors. Workers had complained of headaches, dizziness and shortness of breath after smelling vapors from the tanks. That led to the identification of about 1,500 chemicals present in the head space of the tanks. Occupational exposure limits were then set for individual chemicals. Some workers had wanted to get rid of the respirators because they were heavy, added to heat stress in the summer, and reduced visibility. Workers still had the option to wear respirators if they chose and about 20 percent were doing that in the tank farms where the restrictions were lifted. Respirators were still required for workers within five feet of the vapor vents or if it was believed they would be exposed to higher levels of chemicals.

"We respectfully disagree with the federal district court's conclusion that Initiative 297 is unconstitutional and we are not content to let this decision rest with a single district court judge."

– Washington Attorney General Rob McKenna. (Associated Press, July 12, 2006).

Federal District Judge Alan McDonald ruled that a Washington state initiative that would ban most out-of-state waste from coming to Hanford was unconstitutional in its entirety. Initiative 297 was passed by Washington voters in November 2004 but was not allowed to take effect until the legal challenges were addressed. Judge McDonald ruled that federal law preempted the initiative because it "impermissibly regulates" radioactive material subject to the federal Atomic Energy Act. The court also ruled that the initiative's moratorium on mixed waste shipments to Hanford violated the Commerce Clause of the U.S. Constitution.

"We believe the district court correctly ruled that I-297 is unconstitutional and that the court's ruling will be upheld on appeal."

– DOE spokeswoman Megan Barnett. (Associated Press, July 12, 2006).

Washington state filed an appeal with the Ninth U.S. Circuit Court of Appeals in San Francisco.

Hanford workers completed demolition of an incinerator at the Plutonium Finishing Plant. The incinerator was used from 1963 through 1972 to burn combustible material contaminated with plutonium, allowing recovery of the plutonium for use in nuclear weapons. The incinerator was heavily contaminated when cleanup began.

A new government study showed men who grew up near Hanford in the late 1940s and early 1950s had an increased risk of developing a specific type of thyroid disease. Women did not show a similar increased risk. The study by the Centers for Disease Control's Agency for Toxic Substances and Disease Registry found an increase in Hashimoto's thyroiditis, a condition in which the thyroid produces too little thyroid hormone. The study did not link the disease to exposure to radioactive materials spread into the environment from Hanford.

"By pursuing an option with significant regulatory barriers, Richland increases the possibility of making the capsules an 'orphaned waste' that does not have a disposal path."

– DOE Office of Inspector General Report, on Hanford's cesium and strontium capsules. (OAS-M-06-06, August 2002).

DOE's Office of Inspector General said Hanford's disposal plans for 1,935 cesium and strontium capsules was risky and could result in them being orphaned at the site. The capsules contained more than a third of the radioactivity at Hanford and were stored under water in the 200 Area. Until 2002, it was planned that the cesium and strontium would be mixed with Hanford's tank waste and vitrified, then eventually disposed at the national disposal site at Yucca Mountain. In recent years, Hanford officials had planned to dispose of the capsules directly at Yucca Mountain, without vitrification. The Inspector General audit called that a risky assumption, since Yucca Mountain regulations currently prohibited disposal of the untreated capsules.

The audit called for DOE to further study disposal options and perform a formal cost analysis.

Hanford workers beat a December 31 Tri-Party Agreement deadline to treat and dispose of 24,000 drums containing low-level radioactive waste. The waste included sludge created by the production of fuel elements for a Hanford reactor and some waste dug up from burial trenches. All the waste had been stored at Hanford for more than a decade. The waste was mostly sent to Hanford's Environmental Restoration Disposal Facility for burial.

The Washington Department of Ecology issued a notice of violation to DOE because one of its contractors caused a spill of highly concentrated sodium dichromate to the ground. Washington Closure Hanford workers caused the spill while digging up an old pipeline near the D Reactor, within a quarter mile of the Columbia River. An estimated 30 gallons of liquid sodium dichromate, a form of chromium, leaked into the soil during one excavation project. Another three gallons leaked into the ground from the same pipeline in another spot a few days later. Ecology said there were a number of violations, including failure to provide required notification to DOE and the State.

EPA fined DOE $120,000 because of the two spills. EPA said DOE did not report the first spill to regulators for 11 days and its

▲ ***Waste stored in Hanford's Central Waste Complex.***

"The goal here is to get out of the waste storage business. We are clearing out the backlog of stored drums and getting the waste treated and into final disposal."

–Mark French, DOE. (*Tri-City Herald*, September 19, 2006).

"Were it to reach the river, pure sodium dichromate would be a huge threat to salmon in the Columbia River. This situation represents a breakdown of oversight, management, compliance, and just plain common sense."

– Ecology Director Jay Manning. (Washington Ecology News Release, September 19, 2006).

"We don't like to levy penalties but there was so much wrong (in this case)."

– Dennis Faulk, U.S. Environmental Protection Agency. (*Tri-City Herald,* October 17, 2006).

contractor, Washington Closure, did not correctly handle the spill. In both cases, contaminated soil was put back into the ground.

DOE extended two of its major prime contracts at Hanford while moving forward with a process to replace the contracts with three new contracts in 2008. Fluor Hanford's contract was extended for up to two years and $1.3 billion, while the contract for CH2M Hill Hanford Group was also extended up to two years for $500 million.

DOE's Office of Inspector General said costs to retrieve and dispose of waste from two Hanford burial grounds could cost as much as $324 million, more than double the current estimated cost. The 618-10 and 618-11 burial grounds, located at the south end of the Hanford Site, included trenches and vertical pipes made from welding 55 gallon drums end-to-end. The two burial grounds contained some of the most radioactive waste that was buried at Hanford. The current $136 million budgeted for the work only included retrieval of the waste, storage at Hanford's Central Waste Complex, and burial on the Hanford Site. It did not include costs to treat and repackage some of the waste for disposal at the Waste Isolation Pilot Plant or Yucca Mountain — waste sites that would likely have to take the most radioactive portion of the waste in the burial grounds.

The Hanford Advisory Board selected Susan Leckband as the Board's new chair. She replaced Todd Martin, who would finish his third two-year term in February and could not run again according to the Board's charter. Leckband had been serving as the Board's Vice Chair.

DOE completed its five year review of cleanup actions taken at Hanford, a process required by federal environmental laws. In general, DOE said the actions they had taken so far had been protective of people and the environment. The report acknowledged that in many cases final cleanup actions had yet to be decided.

"We have removed nearly one third of the waste from these burial trenches. When we started the work in October 2003, we anticipated the majority of the waste containers would be in good shape…we're encountering more and more badly corroded drums that require special handling."

– Dale McKenney, Fluor Hanford. (DOE News Release, December 8, 2006).

Hanford workers beat a Tri-Party Agreement milestone to retrieve waste from a large trench used to store plutonium-contaminated waste. "Trench 4" held nearly 2,000 cubic meters of plutonium-contaminated waste in 9,960 containers. All the containers had been removed and the waste taken to compliant treatment, storage, or disposal facilities. The waste containers, mostly drums and boxes, were stacked on asphalt pads, covered with plywood and tarps, then buried under dirt. About half of the waste removed from the trench would be buried in a lined disposal facility at Hanford. The remainder would eventually be shipped to the Waste Isolation Pilot Plant in New Mexico. Hanford workers also beat a December 31 Tri-Party Agreement milestone to retrieve more than 22,600 drums worth of waste from burial trenches in the 200 West Area.

Two Hanford-area groups were among 11 organizations to receive siting grants through DOE's Global Nuclear Energy Partnership. Columbia Basin Consulting Group and Tri-City Industrial Development Council received a joint award to conduct detailed site characterization studies for integrated spent fuel recycling facilities.

DOE expanded Fluor Hanford's duties to integrate all contractor

activities involving contamination of the soil, groundwater and the deep vadose zone.

Washington Governor Chris Gregoire's proposed state budget for the 2007-09 biennium included $1.3 million in additional funding for legal action involving Hanford. Some of the money would be used to support two ongoing lawsuits, while some would be used to address "unacceptable delays which pose an increasing risk to the environment and human health," a reference to delays in getting Hanford's vitrification facilities built and operating.

"I'm worried, candidly. I'm not a big believer in suing. But legal work needs to be done."

– Washington Governor Chris Gregoire. (*Tri-City Herald*, December 22, 2006.)

Tank Waste Treatment

Heart of America Northwest proposed that funding be suspended for construction of key parts of the WTP complex until there were assurances the facilities would work as planned and that cost escalations were under control. The citizen group report said no more construction should be done on the pre-treatment facility or the high-level waste vitrification facility until the design was validated and costs were estimated with reliability; that management and contract reforms were instituted; and that supplemental technologies were fully examined.

"Continuing to provide U.S. DOE and Hanford contractors with $690 million per year for the vitrification plant is enabling stupidity."

– Heart of America Report "Hanford's High-Level Waste Vitrification Plant Risks and Costs are Unacceptable." (January 2006).

Cost estimates to construct Hanford's WTP facilities had escalated dramatically in large part because the initial estimate was unrealistic and never validated, according to a report commissioned by Energy Secretary Samuel Bodman. Subsequent cost estimates continued to be based on the flawed initial estimate. The report also said contractor Bechtel underestimated how complicated some of the technical problems would be and that DOE wrongly assured Bechtel that several technical problems had been worked out by the previous design team. The report added Bechtel did not understand how difficult and expensive it would be to find nuclear facility-quality materials and equipment; underestimated the availability and productivity of qualified labor; and underestimated the cost of regulatory compliance. The report concluded it was likely the total project cost estimate would continue to increase beyond the current $8.35 billion estimate.

"It's a huge mistake to be advocating a slowdown. The technology at issue here is the right technology. It is the right plant. We just need the guts to finish it."

– Jay Manning, Director of the Washington State Department of Ecology. (*Tri-City Herald*, February 2, 2006).

Another report indicated the cost of building Hanford's WTP complex could easily top $10 billion by the time the plant was ready to begin treating radioactive waste in 2017. The 44,000 page Bechtel report — which included new cost and schedule estimates — was provided to Washington State and Congressional leaders. DOE would not endorse the estimates until they were validated by the Army Corps of Engineers. More than two years of the delay and $700 to $900 million of the cost increase were attributed to revised earthquake design standards.

"…other factors (also) impact the project: DOE constrained the annual funding and the Tri-Party Agreement constrained the schedule…(DOE) and (Bechtel) managers were caught in the middle – attempting to complete the project according to an unrealistic, mandated schedule and an inefficient, mandated funding profile."

– Hanford Waste Treatment and Immobilization Plant Project: After-Action Fact-Finding Review. (January 2006).

The Chair of the House Energy and Water Appropriations subcommittee said DOE had "screwed up" construction of Hanford's WTP and should not be rewarded for their mismanagement. Ohio Representative David Hobson told Energy Secretary Bodman that a

"I don't think that's a deal anymore. There is nothing magic about the $690 million figure…I wish I had more of a comfort level with how to get this squared away. We can't abandon it, but I haven't seen one other project with these difficulties. It's a disaster from my standpoint."

– Ohio Representative David Hobson. (*Tri-City Herald*, March 9, 2006).

"It's a bottomless pit. It goes on and on and on."

– Indiana Representative Peter Visclosky. (*Tri-City Herald*, March 10, 2006).

"There is plenty of blame to go around. I am at least as disappointed as you are."

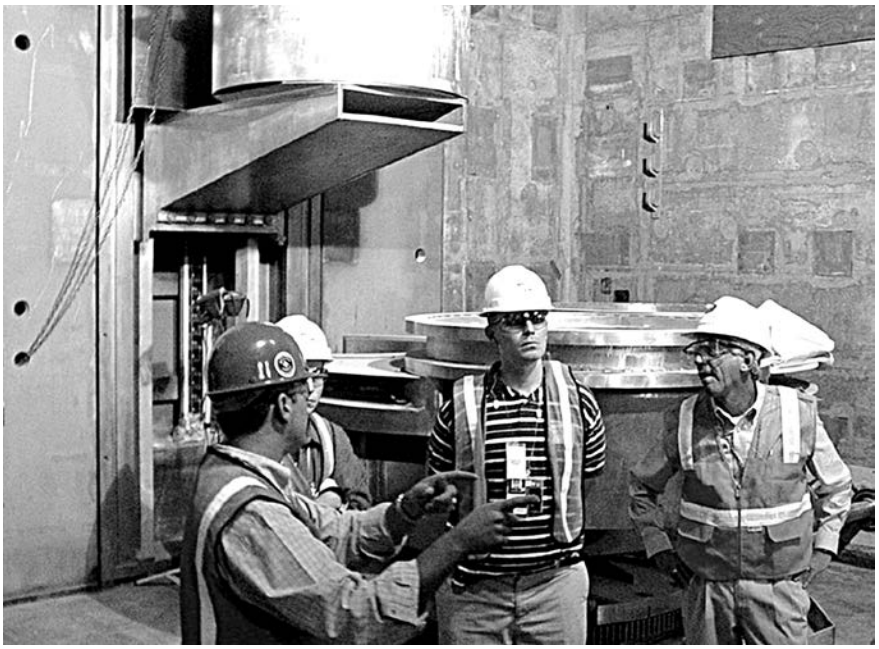
– Energy Secretary Samuel Bodman. (*Tri-City Herald*, March 9, 2006).

previous agreement for Congress to provide $690 million each year for WTP construction was no longer valid, although he hadn't decided what level of funding would be provided. Bodman acknowledged management problems with the project but said he believed they were being resolved. Other members of the committee suggested that perhaps the Nuclear Regulatory Commission should be given broad authority over the plant.

An independent panel identified 28 technical issues that could cause problems with constructing and operating Hanford's WTP. The panel of scientists, engineers and chemical and nuclear industry professionals also concluded that the problems could be fixed and that the WTP was essential. The most serious problem identified was potential clogging of pipes by the waste — which could happen within days to a few weeks of operation under the current design. Sixteen other issues were identified that would prevent the plant from running efficiently and 11 were identified that might cause operating inefficiencies. Resolving all the problems should add no more than three percent to the cost of building the plant. The report recommended purchasing replacement melters and an extensive dry run of equipment in areas that would be too contaminated for workers to enter once operations begin.

The estimated cost of building Hanford's WTP complex climbed another billion dollars by April, according to a new review presented to Congress by an independent team of experts. The project was estimated to cost $11.3 billion and the start of operations was expected to be delayed until July 2018. The study reviewed the most recent cost and schedule estimates prepared by Bechtel National, which was building the facilities for DOE.

The news magazine show *60 Minutes* focused on Hanford's WTP project and said that billions of dollars of taxpayers' money had been



Representatives from the U.S. Congress visit the Waste Treatment Plant complex. ►

"squandered." The report questioned whether DOE was capable of overseeing successful construction and operation of the facilities.

The Government Accountability Office (GAO) recommended ending the "fast track" approach to constructing Hanford's WTP. The GAO said waiting to resume construction on the pre-treatment and high-level waste vitrification facilities until the design was at least 90 percent completed could save money by reducing false starts and delays when the plant began operating.

By June, the cost to build Hanford's WTP facilities was estimated at $11.55 billion, with completion delayed until August 2019. The new estimates, prepared by Bechtel National, assumed continued level funding of $690 million per year. Increased funding to around $800 million a year from 2008 through 2010 would allow the facilities to be completed about a year and a half sooner.

Drilling of the first of four new test holes began during the summer to determine seismic vulnerability for Hanford's WTP. The new study was intended to augment a smaller study in 2004 which showed that

"For the Energy Department, which runs the project, it's been a case of easier said than done. In the nearly 16 years 60 Minutes has been covering this story, it's been one foul up after the next."

– *60 Minutes* Correspondent Lesley Stahl. (*60 Minutes*, April 30, 2006).

"Skeptical members of Congress were the best possible audience for the grim update provided by '60 Minutes' on the soaring expenses and repeated delays of cleanup at Washington's Hanford Nuclear Reservation. The broadcast…was a potent reminder of the lethal threat tens of millions of gallons of radioactive waste in underground tanks pose for this region."

– *Seattle Times* Editorial. (May 2, 2006).

"DOE is continuing with the fast-track approach to try and stay as close as possible to milestone dates agreed to in the Tri-Party Agreement and to keep costs down. However, the technical, safety, and management problems on the project make it clear that a fast-track approach is not appropriate."

– Government Accountability Office Report 06-06-2T. (April 2006).

"Years of revolving-door DOE officials, continual promises to improve management controls and oversight, and sky-rocketing costs have led the committee to the point where it no longer has confidence in the department's estimates in the (WTP project) nor in the department's ability to manage its way back on this project."

– House Appropriations Subcommittee report. (*Tri-City Herald*, May 12, 2006).

◀ ***Borehole drilling on the Waste Treatment Plant site for seismic analysis.***

▲ ***Hanford's Waste Treatment Plant complex in November 2006.***

"We believe anything we would do to shift contractors would be detrimental to the project."

– DOE Assistant Secretary Jim Rispoli. (*Tri-City Herald,* August 23, 2006).

"To effectively manage a project of this size and complexity, the Department must have a credible cost and schedule from which we can effectively plan. With the Army Corps' validation of Bechtel's estimate, we can now begin to put together a reliable baseline that will lead us to the safe and successful construction of the Waste Treatment Plant."

– DOE Assistant Secretary Jim Rispoli. (DOE News Release, September 7, 2006).

▲ ***DOE Office of River Protection Manager Roy Schepens.***

the design for the vitrification facilities was likely not robust enough to withstand a severe earthquake. The new tests would provide a more complete look at how an earthquake might affect the WTP facilities and could result in the need for less robust designs. The analysis of the new results was expected to be completed by June 2007.

DOE Assistant Secretary Jim Rispoli said construction of major portions of Hanford's WTP complex would remain halted through at least the next year to provide sufficient time to ensure that new earthquake design standards were sufficient. Construction would continue on those portions of the WTP complex that would not handle high-level radioactive waste. During a visit to Hanford, Rispoli said DOE remained committed to completing the WTP facilities and immobilizing Hanford's tank waste and that Bechtel National would remain as the lead contractor on the project.

In September, DOE released the Army Corps of Engineers validation report on Bechtel's estimated schedule and cost for completing Hanford's WTP. The Corps recommended adding $650 million to Bechtel's estimated cost to account for potential fluctuations in labor rates and additional project contingency. That brought the total cost to complete and test the WTP to $12.2 billion. The Corps added an additional three months to the schedule, pushing the completion date to November 2019. Both the cost and schedule estimates assumed consistent federal appropriations of $690 million from fiscal year 2007 through completion of the project. More than $3 billion had already been spent.

DOE Office of River Protection Manager Roy Schepens was re-assigned to Headquarters. Schepens had been in the position since June 2002 and would stay on as interim manager until a replacement was found.

An independent technical review identified 19 technical issues to resolve for the demonstration bulk vitrification tests to move forward. The demonstration tests were necessary to determine if the technology was viable to immobilize Hanford tank waste. The review also identified 26 areas of concern and offered 13 suggested improvements. A cost and schedule review of the project was also planned.

Around the DOE Complex

Energy Secretary Bodman announced new regulations intended to improve worker safety across the DOE complex. The rule established a uniform set of standards that would require department-wide compliance and monetary fines for contractors who failed to apply those regulations.

The National Academies' National Research Council recommended that DOE should not be in a hurry to close underground high-level waste storage tanks. The Research Council report, directed by Congress in 2004, encouraged DOE not to close individual tanks where existing technology could not remove hard heels of waste that remained in the tank bottoms. The report said good planning should allow tanks with difficult waste heels to remain open to see if new technology could be developed and still allow cleanup deadlines to be met. The report criticized efforts at DOE's Savannah River Site as a "milestone-driven rush to grout a tank essentially permanently and irrevocably even if much more radioactive material remains than is expected." The report agreed that grout appeared to be the best material for filling the tanks, but said DOE needed to understand more about the long-term ability of grout to inhibit water flow and immobilize waste in the closed tanks. The report also raised concerns about whether enough was known about bulk vitrification to move forward with that technology at Hanford.

"There are a lot of pressures to do things in the near-term at Savannah River and to a lesser extent at Hanford. The committee is concerned the schedule-oriented approach can sometimes lead to decisions that you wouldn't make under more ideal circumstances."

– Study Director Micah Lowenthal. (Associated Press, April 5, 2006.)

"Rather than putting closures on hold for years awaiting new technologies to be developed, new technologies should be matured and integrated in the closure program as they become available."

– Megan Barnett, DOE Headquarters spokesperson. (*Tri-City Herald*, April 5, 2006).

A rail car moves nuclear fuel at Hanford in the 1960s. ▼

New Mexico granted DOE a permit to dispose of "remote-handled" transuranic waste at the Waste Isolation Pilot Plant (WIPP). Since WIPP opened in 1999, more than 5,000 shipments of "contact-handled" transuranic waste — which did not contain much penetrating radiation — had been disposed at the site. Hanford was not on the schedule to begin shipment of remote-handled waste in the near future.

"We've got an area that is contaminated in the groundwater and is migrating towards the Columbia River. And if it gets there…we have an absolute disaster on our hands…I can understand the frustration in Congress. Frankly, they are no more frustrated than me. But the last thing we need is to send a message to this country that it's ok to walk away. It is not. The chances of a catastrophic event over there are real. Time is not on our side."

– Washington Governor Chris Gregoire on *60 Minutes.* (April 30, 2006).

2007

"This is a defining moment for the future success of the cleanup of Hanford."

– Elin Miller, regional administrator for the Environmental Protection Agency, on new Tri-Party Agreement negotiations. (*Tri-City Herald*, May 31, 2007).

The Cleanup

The Hanford cleanup took some major steps forward, and a few steps back. Overall, It was an event-filled year at Hanford.

A routine audit showed that a worker at Hanford's Environmental Restoration Disposal Facility (ERDF) falsified records related to the compaction of waste within the disposal site. Bulldozers were used to compact the contaminated soil and building debris dumped in the

Two new state-of-the-art compactors were purchased for Hanford's Environmental Restoration Disposal Facility after problems with compaction were discovered. ▼

"This has everyone's attention. All the focus is on getting to the bottom of it."

– Pat Pettiette, President of Washington Closure Hanford, on problems at ERDF. (*Tri-City Herald,* January 13, 2007).

"The operational problems identified in this penalty action point to deficiencies in both contractor conduct of operations and DOE oversight. These failures have raised public concerns about ERDF's integrity as a safe and secure waste management facility and slowed cleanup across the site."

– Letter from Daniel Opalski, U.S. Environmental Protection Agency, to Keith Klein, DOE Richland Manager. (March 27, 2007).

"(Washington Closure Hanford) and the Department of Energy have been very responsive to issues. They did not take a Band-Aid or shortcut approach."

– Nick Ceto, Hanford Program Manager for the U.S. Environmental Protection Agency. (*Tri-City Herald*, October 2, 2007).

"Todd's service to Hanford's cleanup is hard to measure but impossible to ignore. He has truly made a difference, and is a tremendous asset to citizens of Washington."

– Jane Hedges, Manager of Ecology's Nuclear Waste program, on outgoing HAB Chair Todd Martin. (Department of Ecology News Release, February 1, 2007).

"These years at Hanford have been the toughest and most rewarding of my life. Running this place is an awesome responsibility; an awesome trust. But I have accomplished what I intended and it's time to move on."

– DOE Richland Manager Keith Klein. (DOE News Release, February 23, 2007).

landfill. The intent was to ensure the ground would not settle sometime in the future and damage the "cap" that would eventually be placed over the landfill to prevent water infiltration. During the past year, the worker had at times not performed the compaction tests but did enter false data.

The U.S. Environmental Protection Agency (EPA), which regulated ERDF, issued the U.S. Department of Energy (DOE) a $1.14 million penalty — its largest fine ever at Hanford. The fine included $835,000 for failure to correctly perform compaction testing. The penalty covered both the falsification of testing records and what EPA believed was the improper use of equipment to test compaction. An additional $305,000 in penalties was assessed because of problems monitoring a system to pump collected water from the landfill. EPA said both DOE and its contractor were at fault. EPA said the problems did not appear to have affected the landfill's integrity. Soil contaminated with mercury was also mistakenly disposed of at ERDF in the spring.

By mid-May, after it had made several changes to its operating procedures, Washington Closure Hanford was cleared to resume nearly full operations at ERDF. The company also purchased two new 120,000 pound compactors. The compactors would be equipped with Global Positioning Systems to allow drivers to see precisely which dirt had been compacted and measure the vertical height of the landfill as each pass was made.

EPA agreed to allow much of the money from the fines to be used on two supplemental environmental projects. DOE and Washington Closure would purchase two emergency response boats for the Benton County Sheriff's Office to provide quick response to any hazardous materials spills in the Columbia River. That project cost $253,000. Another $602,000 would be used to construct a greenhouse and nursery facility at the Washington State University Tri-Cities campus to grow native vegetation for habitat rehabilitation.

Outgoing Hanford Advisory Board Chair Todd Martin received the Washington Department of Ecology's highest award for environmental stewardship, the 'Environmental Excellence Award.' Martin served as the Board's chair for six years and had supported the cleanup of Hanford for more than 20 years.

Two Tri-Cities organizations were awarded $1.02 million to jointly study whether Hanford's Fast Flux Test Facility and nearby buildings could be used as part of DOE's Global Nuclear Energy Partnership — a program designed to revitalize nuclear power and minimize waste generation through the reprocessing of nuclear fuel. Ten other sites around the country were also being studied.

Hanford's two top managers retired. Roy Schepens, manager of the Office of River Protection (ORP), retired February 28 after five years at Hanford. Keith Klein, manager of the Richland Operations Office, retired May 31 after eight years at Hanford and 34 years with DOE and its predecessor.

DOE initiated a nationwide search to fill both positions but even-

tually hired from Hanford. In July, DOE named Dave Brockman as the Richland Office Manager. He had most recently served as the federal project director for the K-Basins closure project. In November, ORP Acting Manager and former ORP Deputy Manager Shirley Olinger was promoted to serve as ORP Manager.

Hanford workers located a major source of chromium near the D and DR reactors, which was a major contributor to groundwater contamination in the area. The area was near a transfer station where chromium was emptied from railroad tanker cars. A well drilled in that area found chromium at more than 10,000 parts per billion, considerably over the 100 parts per billion drinking water standard and the 10 parts per billion regulatory limit for water in the river gravel beds.

Hanford workers completed waste retrieval from the seventh of Hanford's 149 underground single shell tanks. S-112 was a 758,000 gallon capacity tank and held 614,000 gallons of waste when retrieval work began in 2003. Waste retrieval operations continued at several other tanks.

DOE agreed to begin assessing damage to natural resources at Hanford — a reversal of a previous position that resulted in litigation filed by the Yakama Nation and joined by the states of Washington and Oregon and the Nez Perce Tribe and Confederated Tribes of the Umatilla Indian Reservation. DOE had previously stated it would conduct injury assessment only after cleanup was complete.

High-level negotiations began in late May and continued periodically through the year to address major Tri-Party Agreement milestones that DOE was certain to miss. Washington Attorney General Rob McKenna, Ecology Director Jay Manning and DOE Assistant Secretary Jim Rispoli participated in the negotiations at various times. The state's primary concerns were an eight year delay in beginning operations of the Waste Treatment Plant (WTP) and delays in retrieving waste from Hanford's single-shell tanks. The state had indicated it was not likely to agree to extend those existing Tri-Party Agreement milestones unless DOE agreed to accomplish some additional work in the meantime.

"These past five years have been an incredible journey and I'm extremely proud to have had the opportunity to be the manager and to have served with the dedicated and capable team at ORP."

– DOE-Office of River Protection Manager Roy Schepens. (DOE News Release, February 23, 2007).

"We're willing to do more, sooner, now, because we believe we've found ways to do it that won't impact our cleanup obligations and schedules or add unduly to the taxpayer cost."

– DOE Richland Manager Keith Klein, on DOE's agreement to begin assessing natural resource damage at Hanford. (Associated Press, April 3, 2007).

"It doesn't mean we've ruled out going to court but before we do that we will see if we can negotiate an agreement."

– Andy Fitz, Washington state assistant attorney general. (*Tri-City Herald*, April 6, 2007).

"Current deadlines for construction of the waste treatment plant and retrieval of waste from single-shell tanks have been missed and shared concerns about contaminated groundwater and recent technological breakthroughs make it the right time to take action…Discussions will cover the entire clean-up and will focus on ways to protect the Columbia River, the air, soil and groundwater."

– Joint statement from the Tri-Party Agencies. (May 30, 2007).

◀ ***Hanford tank farm workers lower the 'Foldtrack' through a 12-inch access pipe into a Hanford tank. Once in the tank, the Foldtrack unfolds like a child's transformer and is used to push waste to a pump for removal.***

"Pretty shocking."

– Gerald Pollet, Heart of America Northwest, on proposed delays in Hanford's Waste Treatment Plant. (*Tri-City Herald,* September 7, 2007).

"The proposed new and accelerated work related to groundwater and the deep vadose zone does not sufficiently offset the added risks caused by delays in the tank program. More accelerated work is needed elsewhere."

– Letter from Oregon Department of Energy Director Michael Grainey to the Tri-Party Agencies. (October 12, 2007).

"Congress may view such agreements for lengthy delays as a tacit admission that the urgency claimed for these efforts was false. Stretching out the timelines for action will create a disincentive for providing funding to get the job done."

– Hanford Advisory Board Consensus Advice #203, on proposed delays to the Tri-Party Agreement. (November 2007).

"If you look ahead to the budget targets for the next five years, they fall way short of what is needed."

– Nick Ceto, U.S. Environmental Protection Agency Hanford Project Manager. (*Tri-City Herald,* May 10, 2007).

"Hanford's budget will buy a lot of work, but the cleanup is not on schedule."

– Washington Department of Ecology position on the Hanford budget. (May 9, 2007).

"Turning things around took ingenuity, commitment and teamwork. With the spent fuel, debris and sludge out of K-East, we can turn our attention to removing the water and ensuring this basin will never again be a risk to the Columbia River."

– DOE Richland Manager Keith Klein. (DOE News Release, May 31, 2007).

By September, although no agreement had been reached, regulators indicated they might be willing to accept long delays in the start of the WTP and emptying single-shell tanks in return for increased focus on cleaning up Hanford's contaminated groundwater. Start of operations at the WTP would be delayed eight years to 2019, with all waste treated by 2047 instead of the current deadline of 2028. The deadline for emptying Hanford's 149 single-shell tanks would be extended from the current deadline of 2018 to 2040. Work to contain several of Hanford's groundwater plumes would be accelerated by as much as eight to 12 years from current plans. DOE would also commit to developing technologies to clean waste deep in the soil and would be required to produce an annual report that estimated the total cost of remaining cleanup and a schedule for getting it done if Congressional funding was not restricted.

DOE released requests for bids for three contracts to oversee major work at Hanford. One contractor would manage tank farm operations, one would continue cleanup of Hanford's Central Plateau, and the third would handle site support services, including security and maintenance of roads and utilities.

A five year funding profile from the Bush Administration for Hanford indicated increased budgets of about 21 percent from fiscal year 2007 to fiscal year 2012. However, that would still leave the budget about $2 billion short of funds needed to meet Tri-Party Agreement cleanup milestones. For fiscal year 2009 alone, Hanford's Richland Office was directed to receive only $935 million of the $1.5 billion needed to comply with Tri-Party Agreement requirements. The current Hanford budget of about $1.88 billion was projected to steadily increase to $2.28 billion in fiscal year 2012.

Hanford workers completed removal of sludge from the K-East basin by the end of May. Work began in October 2004 to vacuum the radioactive sludge into underwater containers. It was expected to take only a few months to complete but turned out to be far more complicated and time-consuming. Workers removed more than 170 tons of debris from the basin floor and developed various new tools to finally complete the work.

By the end of July, most of the sludge in the K-West basin had also been vacuumed into underwater containers. The work took seven months to complete compared to more than two years for the K-East basin, but there was far less sludge — about 10 cubic meters in the K-West basin and 37 cubic meters in the K-East basin.

By late October, a 14-inch layer of grout had been poured over the floor of the K-East basin to act as a radiation shield, allowing demolition of the basin with less radioactive exposure to the workers.

DOE and its contractors continued to struggle with final treatment plans for the sludge, which was all consolidated into underwater containers in the K-West basin. They were not optimistic about meeting a Tri-Party Agreement deadline of March 31, 2009, to have all the sludge out of the K-West basin and both basins demolished.

A Government Accountability Office (GAO) report concluded that DOE might have dramatically underestimated the cost to clean up buried radioactive wastes at Hanford and other DOE sites. It also questioned whether there was sufficient disposal room in the Waste Isolation Pilot Plant in New Mexico for the large amounts of buried transuranic wastes that might yet be dug up. The report acknowledged that DOE's plans to leave much of the waste in the ground would likely be opposed by regulators and stakeholders.

Hanford was one of about 10 sites identified as a potential location in which to dispose of commercial and government waste called 'greater than Class C waste.' If brought to Hanford the waste, which contained the highest concentration of radioactivity of the four classes of low-level waste, would be buried in either 'enhanced' near-surface disposal or buried in boreholes about 100 feet under the surface. The waste would come from the decommissioning of nuclear power plants, nuclear research and various commercial activities.

About 85 gallons of high-level radioactive waste spilled onto the ground in Hanford's S Tank farm during the early morning hours of July 27. The spill occurred after a pump clogged during the retrieval of the 40,000 gallons of waste remaining in tank S-102. During efforts to unclog the pump, a water line was pressurized and waste was forced out of the line. The spill was estimated to last just under two minutes.

"The estimates reflect the costs of leaving most waste under earthen barriers — typically the least expensive approach. If DOE is required to retrieve substantial portions of these wastes, costs would increase dramatically…DOE's lifecycle cost estimate to remove transuranic wastes buried near the Columbia River at the Hanford Site could triple."

– GAO Report GAO-07-761. (June 2007).

"It's like you've got a huge target on your back when you're living in the Northwest."

– Gerald Pollet, Heart of America Northwest. (The Oregonian, August 24, 2007).

Workers near tank S-102, four months after a spill of tank waste onto the ground. ▼

"The material in this tank is some of the most difficult we've had to deal with in retrieval at Hanford. It flows but it doesn't flow very quickly. It's particularly rough on pumps."

– Richard Raymond, CH2M Hill Hanford, who described the waste in tank S-102 as having a consistency similar to chunky peanut butter. (*Tri-City Herald,* August 1, 2007).

"The consequences could have been much worse. A few minutes earlier there would have been five people within a few feet of the pump."

– John Fulton, President of CH2M Hill Hanford Group, on a spill of high-level tank waste during waste retrieval. (*Tri-City Herald,* September 9, 2007).

"(The potential for this type of accident) was raised and it was analyzed and it was deemed not credible. The potential for it was so low, it was deemed to be an incredible event and not possible, which was obviously incorrect."

– John Britton, CH2M Hill Hanford Group, on a spill of high-level tank waste from tank S-102.(*The Oregonian,* September 21, 2007).

No workers were in the immediate area at the time of the spill and the spill was not confirmed for about eight hours, at which time workers in the area were ordered to take cover. A fixative was sprayed over the spill area to try and prevent any waste from becoming airborne and all tank retrieval activities were halted.

A DOE Accident Investigation Board concluded the accident was avoidable and identified a number of corrective actions. The report said radiation exposures were monitored and were well below any regulatory or corporate administrative control limits. Radiological surveys confirmed no spread of contamination outside the tank farm boundary. However, at least eleven workers reported health symptoms or other concerns. The Washington Department of Ecology issued a $500,000 fine to DOE as a result of the accident.

DOE extended Pacific Northwest National Laboratory's management and operating contract in August for as long as two more years. DOE said in February it planned to seek competitive bids for the contract to manage the national science laboratory, which had been managed and operated since its start in 1965 by Battelle Memorial Institute, a nonprofit group based in Columbus, Ohio.

A minor radiation leak at a Hanford building in June posed no threat to workers or their families, but Battelle spent about $28,000 to replace three employee cars and other personal items to get rid of any residual contamination. A small amount of plutonium 238 leaked from a sealed disc that was used in a series of experiments. Workers in the building who were contaminated moved to another building and drove their vehicles before the problem was discovered.

The Ninth Circuit Court of Appeals overturned four of six jury verdicts from 2005 involving people who had claimed health impacts from past releases of radioactive materials during Hanford's operating years. The Court found procedural errors in three cases, where people with non-cancerous thyroid disease had all lost their verdicts. The Court ruled they deserved new trials. A fourth case, found in favor of a woman who developed thyroid cancer after growing up down wind of Hanford, was found to have exceeded the statute of limitations.

Hanford's T Plant, shown in the 1940s, routinely released radioactive materials to the air during its early years of operations. ►

▲ *A fire in August burned much of Rattlesnake Mountain and the Arid Lands Ecology Reserve.*

Rattlesnake Mountain and most of the Arid Lands Ecology Reserve were blackened by a mid-August fire that burned 67,000 acres. The fire was driven by strong winds but firefighters were able to hold it to less than half of the area of the 2000 fire. This time, no radiological areas of the site were burned and there were no injuries, although the damage to the environment was severe.

DOE and fire officials credited new firefighting tactics, long used by the Forest Service, and the purchase of two all-terrain vehicles which were equipped with drip torches to start back fires and burn vegetation to starve the fire. About one million sage brush, planted after the 2000 fire, were destroyed.

DOE announced in September that it would consolidate surplus, non-pit plutonium at the Savannah River Site in South Carolina. The decision cleared the way for about 2,300 plutonium storage containers at Hanford to be sent to the Savannah River Site. The classified shipments began later in the year. Removing the plutonium from Hanford would also allow for the demolition of the Plutonium Finishing Plant and save tens of millions of dollars in security costs.

Seepage from a proposed reservoir west of Hanford could raise the water table and potentially mobilize contaminants in the soil, spreading them into groundwater or the Columbia River. The analysis by the U.S. Bureau of Reclamation of the proposed Black Rock Reservoir raised concerns about the project, which was intended to

"They did a fantastic job to catch it in the conditions we had. The weather was hot, windy and dry."

– Greg Hughes, U.S. Fish and Wildlife Department. (*Tri-City Herald*, August 18, 2007).

"You can't fight the fire coming toward you, so you get in front of it and burn the fuel out."

– Hanford Fire Chief Bob Kirk. (*Tri-City Herald,* August 23, 2007).

A temporary cap is put in place over portions of Hanford's T Tank farm. ►

"Our major concerns with the information we have received is that it would raise the water table and rewet, remobilize contaminants."

–Jane Hedges, Washington Department of Ecology Hanford Program Manager, on the proposed Black Rock Reservoir. (Associated Press, September 18, 2007).

"At a number of wells we are seeing a dramatic decrease in strontium in the groundwater. It's very encouraging."

– Mike Thompson, DOE groundwater geologist, on the effects of an underground chemical barrier near N Reactor. (*Tri-City Herald,* September 24, 2007).

increase water storage for agriculture in Central Washington and improve stream flows for fish. Columbia River water would be pumped to the reservoir from behind Priest Rapids Dam. The seepage was projected to raise the water table between 20 and 40 feet beneath Hanford's 200 Areas.

Hanford workers injected chemicals into the ground near the N Reactor to form a 300-foot long chemical barrier and help stop the flow of strontium in the groundwater getting into the Columbia River. Initial results were more promising than a test in 2006. Strontium levels in some groundwater monitoring wells were lowered by as much as 90 percent. The chemicals formed calcium phosphate, also called apatite. When strontium came in contact with the apatite, it bound to the soil. More concentrated amounts of the chemicals would be injected in 2008 to help ensure the barrier would last.

Hanford workers began building a temporary "cap" over a portion of the T Tank farm, in an effort to stop rain and other water from soaking into the soil and moving contamination into the groundwater. The cap would cover T-106, which was believed to have leaked about 115,000 gallons of waste — the most of any of Hanford's tanks. Parts or all of nine other tanks would also be covered by the cap. A synthetic fabric was placed over the soil, then sprayed with a plastic which was somewhat similar to the liner in a pickup truck, but more chemically resistant and longer lasting.

Tank Waste Treatment

Full construction resumed at Hanford's WTP complex in mid-September. Thirty-five truckloads of concrete were poured at the high-level vitrification facility, which marked the first major structural construction completed on the facility since late 2005. Construction had been halted for about 20 months while DOE confirmed seismic standards

for the facilities. Major structural construction on the pre-treatment facility was expected to begin in January. Workers would continue to focus on completing the laboratory, the low-activity waste vitrification facility and support facilities by 2012. The number of workers would gradually increase to about 1,400 over the next year as the contractor, Bechtel National, resumed full-scale construction.

DOE's official cost estimate for Hanford's WTP complex went up to $12.26 billion, more than double the official estimate in 2003. The estimate was contingent upon funding of at least $690 million annually until completion. Full operation of the WTP would begin in November 2019. DOE approved the new estimate after adding $57 million to cover a portion of the contractor's fee and cover additional technical project review and oversight. Congress had so far authorized $3.64 billion.

In addition to the $12.26 billion it would take to construct the treatment facilities, the estimated cost to treat Hanford's tank waste and close the 177 underground storage tanks increased by $18 billion to $44 billion. Contingency costs of as much as $18 billion could raise the total cost to $62 billion. Under the revised DOE schedule the work would be completed in 2042, well beyond the current 2028 Tri-Party Agreement milestone.

Starting up Hanford's low-activity waste (LAW) vitrification facility five years before the entire WTP complex was operational could result in early treatment of more than seven million gallons of radioactive waste in Hanford's tanks. However, it would cost nearly $1

"We're being very methodical about resumption of construction. You can't go from zero to 60 in two seconds. You want to make sure the guys coming on are appropriately trained."

– John Eschenberg, DOE-ORP's Waste Treatment Plant Project Manager. (Associated Press, September 19, 2007).

"We're stretching the overall project out. Every year you operate, the more it costs."

– Zack Smith, DOE-ORP acting deputy manager. (*Tri-City Herald*, June 8, 2007).

Construction resumed on the high-level vitrification plant. ▼

billion to do that. A study performed by CH2M Hill Hanford Group for DOE indicated the LAW facility could begin operating as early as June 2014, more than five years earlier than the rest of the WTP complex. Other advantages to the early start were freeing up tank space and providing early operational experience. Among the negatives, some type of interim pre-treatment system would have to be built and the early start could hamper construction at the rest of the complex due to radiological control and security restrictions. DOE had not made a decision as to whether to pursue early LAW.

The GAO told Congress that DOE needed to re-evaluate whether bulk vitrification was needed and if so, whether it was the best option to treat some of Hanford's tank waste. The GAO blamed a fast-track approach that greatly escalated the price and extended the schedule by several years. Testing occurred during the year at the bulk vitrification test facility near the Hanford Site to try and resolve several outstanding technical issues and help determine whether to use bulk vitrification on a large scale. The estimated cost of operating the plant and treating the waste increased from about $1.3 billion to about $3 billion, about the same cost as expanding the WTP to add a second LAW treatment facility. DOE considered that option too expensive in 2003 when it began to pursue bulk vitrification.

The permit for the Integrated Disposal Facility was changed to 'custodial care,' as no waste was expected to be brought to the facility for at least a few years.

"Originally, DOE justified the bulk vitrification project as a relatively low-cost, rapidly deployable supplemental technology to assist the department to complete the tank waste treatment at Hanford by 2028. However, none of the key components to this justification remains today...It is now apparent that completing tank waste treatment at Hanford by 2028 is not possible under any reasonable scenario and that the waste treatment plant must operate far longer than DOE previously planned."

– Government Accountability Office Report GAO-07-762. (June 2007).

Around the DOE Complex

The GAO reported that DOE had not fully implemented new security improvements at several DOE sites to protect against terrorist attacks. At least five of 11 DOE sites were expected to miss deadlines for security upgrades, some by several years. DOE had delayed implementing some security improvements, such as at Hanford, because of plans to consolidate its plutonium elsewhere.

"The successful consolidation and disposition of special nuclear material has the potential to significantly reduce the risks posed by storing this material as well as the security costs that can reach hundreds of millions of dollars at each DOE site that stores it."

– Government Accountability Office Report GAO-08-72. (October 2007).

"The department seems to think that the terrorist threat to its nuclear facilities is no more serious than a Halloween prank, as evidenced by its failure — more than six years after the 9/11 attacks — to do what it must to keep our stores of nuclear-weapons-grade materials secure."

– Massachusetts Congressman Edward Markey. (*New York Times*, October 29, 2007).

"Before the spill was discovered, a series of poor decisions put workers in grave danger from exposure to the tank waste and vapors. This accident calls into question the adequacy of the safety culture which is so critical at the tank farms."

– Jane Hedges, Manager of Ecology's Nuclear Waste Program, in announcing a $500,000 fine following a July leak in Hanford's S Tank farm. (Washington Ecology News Release, December 4, 2007).

2008

"Since the spring of 2007, we have attempted to negotiate a resolution to this matter…The State has now concluded that (the U.S. Department of) Energy will only treat and retrieve tank waste in a timely manner if a court intervenes, establishes a schedule, and maintains oversight of the work until it is completed. We are filing suit to achieve this result."

– Letter from Washington Governor Chris Gregoire and Attorney General Rob McKenna to Energy Secretary Samuel Bodman. (November 24, 2008).

The Cleanup

U.S. Department of Energy (DOE) and State of Washington officials met periodically throughout the spring and summer to try to reach agreement on new milestones related to construction and operation of Hanford's Waste Treatment Plant (WTP); schedules to remove waste from Hanford's single-shell tanks; and accelerated work to clean up Hanford's contaminated groundwater. Washington Governor Chris Gregoire traveled twice to Washington D.C. and met with Energy Secretary Samuel Bodman in an effort to try and reach an agreement. Some progress was noted in the negotiations, and in April, Governor Gregoire said litigation was unlikely. Attorney General Rob McKenna said in late September the State of Washington would go to court to enforce Hanford cleanup requirements only if it was the best way to serve the state's interests.

Structural work in the Waste Treatment Plant's High-Level Vitrification Facility.

"It appears Governor Chris Gregoire is rapidly nearing the stage where she has no other viable option left to get the federal government's attention on cleaning up the Hanford nuclear reservation. And to that we say: 'Sue their socks off, Governor, if that's what it takes.'"

– *Yakima Herald* Editorial. (March 3, 2008).

"Our community clearly understands that collateral damage from legal action on the Tri-Party Agreement will primarily be felt here. In the larger sense, we also cannot see how litigation will help clean up the Hanford site."

– Letter from the Tri-Cities Industrial Development Council and the Hanford Communities to Washington Governor Chris Gregoire and Energy Secretary Samuel Bodman. (*Tri-City Herald,* September 17, 2008).

"The cleanup schedule that we were prepared to agree to is realistic and technically achievable. It was the federal government's insistence on unacceptable legal terms that made an out-of-court settlement impossible."

– Attorney General Rob McKenna. (State of Washington News Release, November 25, 2008).

"With a new administration comes the possibility for a settlement, rather than a drawn-out legal battle. But after so many broken promises, the state would be foolish to rely on hope. It must insist on enforcement."

– *Spokesman Review* Editorial. (November 28, 2008).

"The motives driving Gregoire and McKenna to the courthouse are easy to grasp. It's the timing that's questionable…Yes, talks with the current administration are at an impasse, but it's likely the Obama administration will be more receptive to the state's point of view than Bush's team. At least it should have the chance to prove otherwise."

– *Tri-City Herald* Editorial. (November 30, 2008).

Negotiations had begun in early 2007 to address the fact that DOE would not be able to meet a 2011 Tri-Party Agreement milestone to have the WTP operational. Nor would DOE be able to meet numerous milestones related to the retrieval of waste from Hanford's underground single-shell waste storage tanks. The State of Washington was willing to negotiate later milestones but wanted an increased focus on cleaning up Hanford's contaminated groundwater and other concessions in return.

DOE and the state reached agreement in principle on new cleanup deadlines which were substantially the same as made public in mid-2007. The start of operations at the WTP would be delayed eight years to 2019, with all waste treated by 2047 instead of the current deadline of 2028. The deadline for emptying Hanford's 149 single-shell tanks would be extended from 2018 to 2040. Work to contain several of Hanford's groundwater plumes would be accelerated by as much as eight to 12 years from current plans. DOE would also commit to developing technologies to clean waste deep in the soil and would be required to produce an annual report that estimated the total cost of remaining cleanup and a schedule for getting it done if Congressional funding was not restricted.

However, the state and the U.S. Department of Justice could not agree on language that the state believed would make revised deadlines enforceable and in late November the State of Washington filed suit in federal district court in Eastern Washington. The lawsuit asked a judge to set new enforceable deadlines for cleanup.

Governor Gregoire said she welcomed the January arrival of President-elect Barack Obama in the White House and was ready to work with his new Energy Secretary to find a solution to the stalled negotiations.

A welder inside the Waste Treatment's Plant's Low-Activity Waste Vitrification facility. ►

▲ ***Work inside the K-East basin building.***

Significant progress was made at Hanford's K-Basins — once among the highest cleanup priorities in the entire DOE nuclear weapons complex.

In January, Hanford workers completed vacuuming up the remaining sludge from the floor of the K-West basin. That completed work begun in October 2004 to vacuum up about 47 cubic meters of highly radioactive sludge from the floors of the K-West and K-East basins. Later in the year, the remaining scraps of spent nuclear fuel were removed from the basin, dried, and sent to Hanford's Canister Storage Building for indefinite storage.

While the K-West basin would have to remain in place as long as the sludge remained in underwater containers on the floor of the basin, there were no longer any such restrictions for the K-East basin.

Water in the basin — about one million gallons — was drained during February and March and taken in 5,000 gallon tanker trucks to the Effluent Treatment Facility. Because the basin had leaked at least twice in the past, removing the water had been a priority.

The basin was then filled with a sand and grout mixture to provide radiation shielding for the workers and to provide a platform for heavy machinery for tearing down the building above the basin. By the end of September, the building had been demolished and work began to remove soil just outside the basin to get at the concrete basin itself. Because of the past water leaks from the K-East basin, contaminated soil beneath the concrete basin would also be removed.

"Every victory we've had at the K-Basins has been hard fought, and this one is certainly no different."

– Matt McCormick, DOE Assistant Manager for the Central Plateau, on the last of the sludge being vacuumed into containers. (DOE News Release, January 7, 2008).

"We know the K-East basin has leaked contaminated water several times, primarily in the 1970s. We want to eliminate the potential for any future leaks and get to the contaminated ground beneath as soon as possible."

– Tom Teynor, DOE. (DOE News Release, February 7, 2008).

"We're moving quickly to drill the wells and install the equipment needed to triple the amount of groundwater we can treat – from 300 gallons per minute to 900 gallons per minute."

– Bruce Ford, Fluor-Hanford. (DOE News Release, March 11, 2008).

"This is a dramatic increase in the treatment system which will better protect the river and speed us toward completing the cleanup of this part of Hanford's groundwater."

– Larry Gadbois, U.S. Environmental Protection Agency. (DOE News Release, March 11, 2008).

"The plume here has been far more persistent than expected."

– John Zachara, Pacific Northwest National Laboratory, on a uranium groundwater plume. (*Tri-City Herald*, September 18, 2008).

"Past remediation experience says we should plan to find waste that could spontaneously ignite, plutonium-contaminated objects and other potentially hazardous materials. We have to be prepared to deal with the worst-case."

– John Darby, Washington Closure Hanford. (Washington Closure News Release, January 9, 2008).

Work was also underway to accelerate groundwater cleanup efforts near the K-East reactor. Additional funds provided by Congress were being used to expand an existing groundwater pump-and-treat system. A large plume of hexavalent chromium was the concern.

DOE, the U.S. Environmental Protection Agency (EPA), and the State of Washington moved forward with plans to construct the largest groundwater treatment system at Hanford to clean up contaminated groundwater in the northern part of Hanford's 200 West Area. The contaminant of most concern was the solvent carbon tetrachloride, which covered a four to five square mile area. The agencies proposed to drill 50 new wells for a pump-and-treat system to treat more than 1,600 gallons of groundwater per minute. Initial estimates called for bringing the new treatment system on line in two to three years to replace a smaller treatment system installed in the 1990s. The new treatment system was expected to remove 95 percent of the contaminants from groundwater in the area within 25 years.

Washington State University and three national laboratories received a three-year $1 million grant to continue research on the fate of radioactive waste that had leaked from Hanford's underground tanks. The project focused on developing a computer model that could predict how wastes moved in Hanford's soil.

A five-year $13 million research project began to examine the behavior of uranium in Hanford's soil and groundwater. Thirty five new monitoring wells were drilled around an old disposal pond in which uranium-contaminated waste water had been dumped.

Excavation of one of Hanford's more high-risk burial grounds began in January and continued through much of the year. The 618-7 burial ground was used from 1960 through 1973 to dispose of waste from Hanford's 300 Area. It was expected that some of the waste might ignite when exposed to the air, so special procedures were put in place. Intact drums were opened inside a specially equipped enclosure, with a hopper of sand ready to fill the enclosure if the contents caught fire. Only five drums within the excavation were exposed at any time and only one drum removed from the excavated area until its contents had been identified and stabilized. Workers were suited

Workers at the 618-7 burial ground. ►

in protective clothing and breathed supplied air. The ten acre burial ground contained three burial trenches and was located just one mile north of the city of Richland.

Excavation work began in late summer on one of Hanford's original burial grounds. The 618-1 burial ground was the first burial ground in the 300 Area and was used from 1945 through 1951.

The Bush Administration proposed cutting Hanford cleanup funding for fiscal year 2009 by $58 million, which sparked a concerted effort by the Washington and Oregon Congressional delegations to increase the funding. Congress eventually failed to pass a new budget and DOE's funding levels from 2008 were continued with the expectation that some supplemental funding would be approved early in 2009.

In early November, DOE's Richland Office notified the State of Washington and EPA that 23 Tri-Party Agreement milestones were at risk due to anticipated funding shortages. DOE asked that its regulators work with them to make the "necessary adjustments" to the milestones, all of which related to projects in Hanford's Central Plateau. DOE also directed its contractor to suspend all work to meet the milestones. EPA sent a letter to DOE reminding it that the milestones remained in place until DOE's regulators — EPA and the Department of Ecology — agreed to the changes.

Hanford workers completed installation of a temporary "cap" over a portion of the T Tank farm, in an effort to stop rain and other water from soaking into the soil and moving contamination into the groundwater. The 70,000 square foot cap covered T-106, which was believed to have leaked about 115,000 gallons of waste — the most of any of Hanford's tanks. Parts or all of nine other tanks were also covered by the cap. A synthetic fabric was placed over the soil then sprayed with a plastic which was somewhat similar to the liner in a pickup truck, but more chemically resistant and longer lasting.

The Ninth Circuit Court of Appeals ruled that the statute of limitations had not expired for individuals suing for health impacts they contended were caused by radioactive material releases to the environment from Hanford during its operating years. The ruling also restored a $317,000 judgment for an individual that had been overturned in 2007. The Court also ruled that past Hanford contractors were not entitled to blanket legal immunity just because they operated Hanford under contract to the federal government. An appeal to the U.S. Supreme Court was denied.

The Ninth Circuit Court of Appeals upheld a Federal District Court ruling in 2006 that Initiative 297 — passed by Washington voters in 2004 — was unconstitutional. The initiative would have stopped most waste from coming to Hanford from other DOE sites. The initiative was challenged before it could ever be implemented. The State of Washington chose not to appeal the ruling to the U.S. Supreme Court.

A number of new fines were levied as a result of the July 2007 spill of high-level tank waste during waste retrieval operations.

In April, Ecology fined DOE $500,000, with half the fine waived if certain performance and safety measures were met. DOE would pay

"Buried in President Bush's proposed budget for next year is a story of broken promises. It's a story that puts our nation's honor — and our environment, economy and families — on the line. The president wants to increase spending on every major category of our government's nuclear program except one: cleaning up the toxic legacy that lurks at nuclear reservations and facilities around the nation."

– Guest Editorial from Washington Governor Chris Gregoire and Senator Maria Cantwell. (*The Washington Post,* March 3, 2008).

"Telling the story of the nuclear cleanup budget during the Bush Administration is almost like a soap opera or television miniseries…'tonight, watch the tragic story of a jilted bride lured by promises of accelerated cleanup funding, only to be left at the altar, forgotten and neglected."

– Washington Congressman Doc Hastings, at the 34th Annual Waste Management Conference in Phoenix. (February 25, 2008).

"Are you proud of this budget?"

– Washington Senator Patty Murray's question of Energy Assistant Secretary Jim Rispoli at a Senate subcommittee hearing. (*Tri-City Herald,* April 10, 2008).

"DOE has chosen to unilaterally suspend work on a number of milestones…without making any prior attempt to reach agreement on appropriate adjustments in workscope or milestones…The listed Tri-Party Agreement milestones remain in effect and subject to enforcement action until modified."

– Letter from Larry Gadbois, Acting U.S. Environmental Protection Agency Hanford Program Manager, to DOE Richland Manager Dave Brockman. (December 3, 2008).

a penalty of $50,000 and perform two supplemental environmental projects. DOE's tank farm contractor, CH2M Hill Hanford Group, would replace twelve large air filters in the TY single-shell tank farm. CH2M Hill would also provide $100,000 worth of emergency equipment to the Tri-County Hazardous Materials Response Team.

In June, DOE fined CH2M Hill $302,500 for safety violations related to the spill. DOE said it was concerned about the delays in detecting the spill and issues that led to the spill occurring.

Also in June, CH2M Hill agreed to spend another $30,800 to resolve a fine issued by EPA against DOE and the contractor for delays in reporting the spill to the National Response Center. CH2M Hill paid a cash penalty of $6,800 and bought $24,000 of equipment for the Tri-County Hazardous Materials Response Team.

Nearly a year after the waste spill, limited work resumed on retrieving waste from Hanford's single-shell tanks. Work resumed in June inside tank C-109, where about 9,500 gallons of sludge and other solids remained. The effort was slowed when a remote-controlled miniature bulldozer that had been lowered in the tank lost one of its treads.

Retrieval efforts in tank C-110 began in September. About 177,000 gallons of sludge remained inside the 530,000 gallon tank. Retrieval would be accomplished using a technique known as modified sluicing

Hoses and other equipment needed for tank waste retrieval crowd the C Tank farm. ▼

which used nozzles to spray the waste with liquid to mobilize it or otherwise break it up and move it to a pump for removal.

Hanford briefly surfaced as at least a regional issue in the Presidential campaign. During a campaign stop in Pendleton, Democratic candidate Barack Obama was asked about some of the problems at Hanford and Obama admitted he didn't know much about Hanford. During a visit to Washington state the previous week Republican candidate John McCain had promised to speed cleanup efforts at Hanford and push for technological advances in disposing of nuclear waste.

DOE selected new contractors to manage its tank farms and continue cleanup of Hanford's Central Plateau. Washington River Protection Solutions, LLC was selected as the tank operations contractor to store, retrieve and treat Hanford tank waste and close the tank farms. The contract was valued at $7.1 billion over ten years (a five-year base period with options to extend for up to five years). The company replaced CH2M-Hill Hanford, a subsidiary of which was awarded the contract for cleanup in Hanford's Central Plateau. CH2M Hill Plateau Remediation Company received a contract valued at $4.5 billion over ten years (a five-year base period with options to extend for up to five years). The company replaced Fluor Hanford.

DOE also awarded a contract to handle site support services, including security and maintenance of roads and utilities. A team led by Lockheed Martin Integrated Technologies called Mission Support Alliance, LLC won the contract valued at $3 billion over ten years (a five-year base period with options to extend for up to another five years). That award was protested and not officially awarded at year's end.

Workers broke open welds and entered the cocooned F Reactor for the first time in five years. No degradation was found in the reactor and there was no evidence of animal intrusion.

For the fifth year in a row, Hanford workers beat Tri-Party Agreement milestones to retrieve certain amounts of suspect transuranic waste that was temporarily buried in trenches in the 1970s and 1980s. About half of the waste would eventually be shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico for permanent disposal. The remainder of the waste would be disposed at Hanford.

DOE proposed to close its Waste Receiving and Packaging facility in early 2009 for an indefinite period and send transuranic waste to the Idaho National Laboratory for processing prior to shipment to WIPP. About 1,000 drums of waste were planned to be sent to Idaho in late 2008. Concern by Hanford unions about a potential loss of Hanford jobs led DOE to rescind the decision to ship the waste to Idaho — at least for the time being. DOE said Idaho could process and package transuranic waste faster and less expensively than Hanford. DOE did indicate that with cleanup work focused primarily along the Columbia River, shipping transuranic waste to WIPP was less of a priority. As a result, Hanford shipments of transuranic waste to

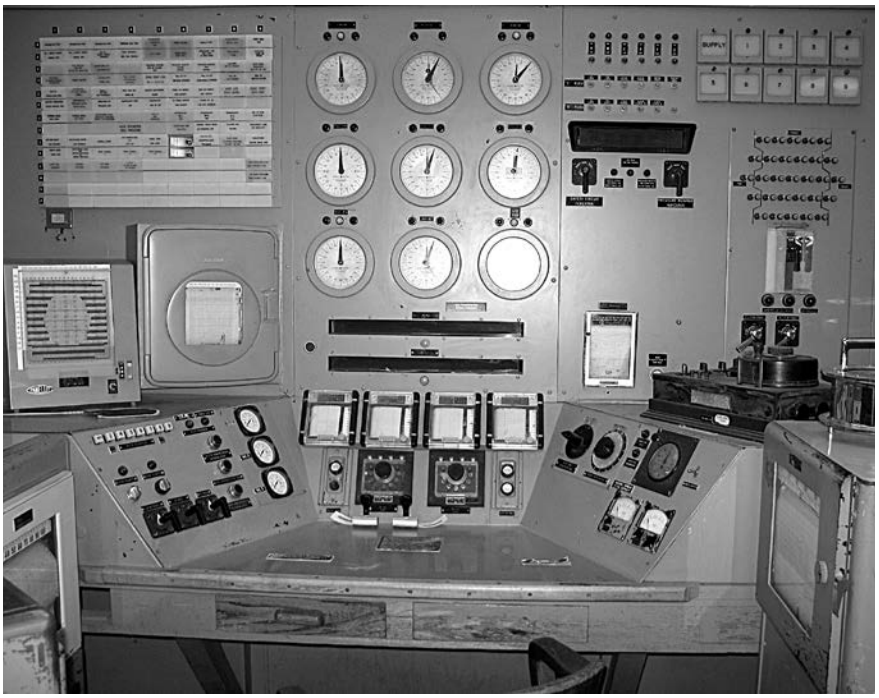
"Here's something that you will rarely hear from a politician, and that is that I'm not familiar with the Hanford site, so I don't know exactly what's going on there. Now, having said that, I promise you I'll learn about it by the time I leave here on the ride back to the airport."

– Presidential candidate Barack Obama, during a campaign stop in Pendleton. (Associated Press, May 20, 2008).

"This project has been very challenging, with difficult field conditions due to heat and wind and degraded waste containers."

– Dale McKenney, Fluor Hanford. (*Tri City Herald*, September 12, 2008).

The control room in B Reactor. ►



"B Reactor has a special feeling and association — as a landmark should. For its role in the events that ended World War II, the B Reactor holds a powerful historic significance."

– Department of Interior Deputy Secretary Lynn Scarlett. (Department of Interior News Release, August 25, 2008).

"Our visitors stand in awe at the Reactor's massive front face, where fuel was inserted for irradiation and walk the floors of the control room where the famed physicists and engineers of the Manhattan Project watched as their secret invention came to life. It's something we'd like more people to be able to experience."

– DOE Richland Manager Dave Brockman, on B Reactor. (DOE News Release, March 12, 2008).

"Samples will be collected from the flowing river and the river channel, including from behind Wanapum, Priest Rapids, McNary and Bonneville dams. Samples also will be collected along shorelines, at irrigation outfalls and at some boat launches and riverfront parks."

– Jeff Lerch, Washington Closure. (DOE News Release, October 27, 2008).

WIPP could be suspended for as long as five years. Hanford workers would continue to retrieve some suspect transuranic waste that was temporarily buried after 1970, but at a reduced pace from recent years.

The Government Accountability Office (GAO) said DOE continued to be plagued by cost increases and project delays on its 10 largest projects — five of them at Hanford. The largest increases had occurred in Hanford's tank waste treatment program, which had caused additional delays and cost increases in the program to empty waste from Hanford's tanks.

The U.S. Department of the Interior designated Hanford's B Reactor as a National Historic Landmark. DOE also announced plans to greatly increase public access to Hanford's first operating reactor beginning in early 2009. Earlier in the year, DOE had issued a policy directive that required the reactor to be maintained in a state that preserved its historical significance.

Up to 100 miles of hiking trails were proposed for the Hanford National Monument as part of a long range management plan released by the U.S. Fish and Wildlife Service. About 26,000 more acres of Hanford land would be opened to the public as cleanup moved forward. The White Bluffs boat launch would remain open to motorized boats but access to Columbia River islands would continue to be restricted above the high water mark.

A major effort began to sample Columbia River water, sediment and fish along 120 miles of the river to determine potential risks from Hanford contaminants to people, animals and plants. About 1,200 samples would be collected over an 11 month period to help determine whether additional studies or cleanup measures were needed to reduce impacts to the Columbia River and its users.

Tank Waste Treatment

The GAO said DOE lacked comprehensive information about the condition, contents, and long-term safety of Hanford's waste tanks. The GAO recommended that DOE prioritize assessing single-shell tank integrity; quantify specific risks in light of continued tank use; and work with state and federal regulators on realistic cleanup milestones.

The Nuclear Regulatory Commission (NRC) concluded that DOE's regulatory processes for Hanford's WTP were adequate to ensure public health and safety. An NRC report identified several technical issues and offered suggestions for DOE in areas including transparency of its processes and radiation safety.

A DOE-commissioned expert panel said adding a second low-activity waste vitrification facility to Hanford's WTP would provide extensive flexibility and help assure that all of Hanford's tank waste could be treated in a reasonable amount of time. The WTP as currently designed could treat only about half of Hanford's low-activity tank waste and the panel was tasked with examining several different alternatives. Since the amount of supplemental treatment capacity needed was still highly uncertain, the panel said a final decision could be made as late as 2017. The panel urged DOE to focus its attention now on getting the WTP completed and operational. The panel said that bulk vitrification offered fewer advantages than originally thought and further testing should not receive a high priority.

Through December, design of the WTP complex was 69 percent completed and construction was 41 percent completed.

Around the DOE Complex

DOE recommended that rather than seek a second location for disposing of high-level nuclear waste, the statutory capacity limit at the Yucca Mountain repository be raised. The Nuclear Waste Policy Act (NWPA) required DOE to report to the President and Congress on the need for a second repository for the nation's spent nuclear fuel and high-level radioactive waste. The NWPA set a statutory capacity limit of 77,000 metric tons of heavy metal for Yucca Mountain until a second repository was in operation. The inventories of commercial and federal government waste were projected to exceed that amount by 2010.

A new DOE estimate for the cost of opening and operating Yucca Mountain grew to $90 billion. That estimate was a $32 billion increase over DOE's previous official estimate in 2001. Some of the increase was due to inflation. DOE said it also was based on expectations that Congress would allow Yucca Mountain to be expanded. Nine billion dollars had already been spent on the Yucca Mountain project.

"DOE's tank management strategy involves continuing to use Hanford's tanks to store waste until the waste is removed and disposed of and the tanks are permanently closed, a period measured in decades…The lingering uncertainties over tank condition and contents, combined with the tanks' advancing age…raise serious questions about the tanks' long-term viability."

– Government Accountability Office Report GAO-08-793. (June 2008).

"Completing WTP construction and initiating waste processing operations by 2019 should be the program's highest priority. Waste retrieval and transfer limitations may potentially extend mission duration. We believe that infrastructure upgrades and waste retrieval system improvements essential for providing feed to the WTP have too low visibility and priority."

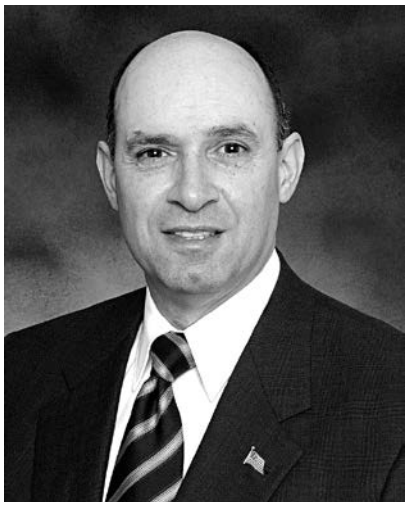
– External Technical Review of System Planning for Low-Activity Waste Treatment at Hanford." (November 2008).

"The statutory limit is not based on any technical considerations, and the repository layout at Yucca Mountain can be expanded to acommodate three times the amount of fuel allowed under the current arbitrary cap."

– Energy Secretary Samuel Bodman. (DOE News Release, December 9, 2008).

"He demonstrated and set the example that technical and sometimes dangerous projects can be well managed while at the same time adhering to the highest safety standards."

– Energy Secretary Samuel Bodman, on Energy Assistant Secretary Jim Rispoli. (DOE News Release, November 5, 2008).



▲ *Energy Assistant Secretary Jim Rispoli*

DOE gave final approval to a consolidation of the nation's nuclear weapons complex. The program limited plutonium, highly enriched uranium and production of tritium to just five sites, compared with the current seven.

With the change from the Bush Administration to the Obama Administration, major changes also came to DOE. Energy Assistant Secretary Jim Rispoli announced his resignation effective in late November, and President Obama nominated Steven Chu, a Nobel Prize-winning physicist and director of the Lawrence Berkeley National Laboratory in California, as Energy Secretary.

"Dear President-elect Obama. Your expression of ignorance regarding the Hanford nuclear site during last spring's campaign swing through Oregon has us worried…We can't afford backsliding while your administration figures out what's going on at the nuclear site…
We know you face a daunting list of issues and approaching crises – the economy, two wars, education, health care, energy and a deteriorating national infrastructure.
But Hanford is a crisis waiting to happen."

– *Tri-City Herald* Editorial. (November 18, 2008).

2009

"The size and speed of the stimulus feels a bit like the movie, 'Brewster's Millions,' in which actor Richard Pryor has to spend $30 million in 30 days. In Brewster's, however, the goal is to spend the money and have nothing to show for it. The Mid-Columbia's goal is quite the opposite. We want to spend the money and have plenty to show for it."

– *Tri-City Herald* Editorial on nearly $2 billion of federal stimulus money for Hanford. (April 14, 2009).

The Cleanup

Hanford was one of the biggest winners as far as the national economic stimulus package. Washington Senator Patty Murray proposed in mid-January that the U.S. Department of Energy's (DOE) environmental cleanup program receive $6 to $7 billion as part of any economic stimulus. DOE had also proposed that level of funding. The money would be primarily intended to reduce the footprint of DOE's larger sites such as Hanford and complete the cleanup at some of DOE's smaller sites. DOE projected it would save and create thousands of jobs almost immediately. Hanford managers said they had no shortage of "shovel-ready" projects that would qualify for federal stimulus money and enough flexibility in their new contracts to move quickly.

"We could put more money to really good work. We're ready to roll. We'd just have to hire the people."

– DOE-Richland Manager Dave Brockman. (Associated Press, January 20, 2009).

Stimulus funds helped pay for cleanup work near Hanford's U Plant. ▼

"It would be extremely unfair and harmful if increased stimulus funding for cleanup was later used as an excuse to reduce budget requests and annual appropriations."

– Washington Congressman Doc Hastings, who voted against the stimulus package. (*Tri-City Herald,* February 14, 2009).

"With this great opportunity comes great responsibility."

– Doug Shoop, DOE Richland Deputy Manager, on extensive reporting requirements for the stimulus funds. (*Tri-City Herald*, March 19, 2009).

▲ ***DOE Richland Manager Dave Brockman.***

"There's an urgency to get work started and people employed."

– Dave Brockman, DOE Richland Manager. (*Tri-City Herald*, April 2, 2009).

Congress did not immediately agree to the idea. While a U.S. Senate stimulus package initially included $6 billion for DOE's cleanup program, the U.S. House stimulus bill included just $500 million. By early February, the differences had been reconciled and Congress passed the $790 billion economic stimulus bill. It included about $6 billion for DOE's environmental cleanup program.

By the end of March, Hanford's share of the stimulus money was set — $1.961 billion. Hanford was the largest single recipient of federal stimulus funds. DOE said the money should create and save about 4,400 jobs.

DOE's Richland Office received $1.635 billion. The money would be used to demolish nuclear facilities and support facilities, clean up waste sites, and retrieve solid waste from burial grounds. Major emphasis would be on cleanup and demolition work at the Plutonium Finishing Plant and expansion of groundwater treatment systems. Two new cells would be built at the Environmental Restoration Disposal Facility (ERDF). With increased money for work along the Columbia River corridor it was hoped that DOE could shrink the active area of cleanup at the 586-square-mile site to 75 square miles or less by 2015.

DOE's Office of River Protection received $326 million. That money would be used to upgrade equipment and facilities, including the 222-S analytical laboratory, the effluent treatment facility and the evaporator. Work would also be done to upgrade the tank farms to ensure they were able to support operation of the Waste Treatment Plant (WTP) when it became operational around 2019. DOE would also conduct structural integrity analysis of its single-shell tanks.

In early April Hanford received the first $1.5 billion of its stimulus funds. Job fairs were held and Hanford contractors began to hire and train new workers and also retained more than 250 workers who had been scheduled to be laid off. DOE was required to obligate the stimulus money by the end of September and spend it all before October 2011.

Among the first projects begun with stimulus funding was demolition of three buildings used until the early 1950s for underwater

Fuel storage buildings in the 200 North Area, and during demolition (facing page). ►

storage of spent fuel rods prior to chemical processing. The three buildings, located north of the 200 Areas, had 20-foot deep basins for temporary storage of the fuel. In later years, two of the buildings were used to store equipment and waste. Contaminated railcars were also parked in the area.

It wasn't long before Hanford's stimulus funding was criticized along with other projects as being "wasted, mismanaged or directed towards silly and shortsighted projects." Arizona Senator John McCain and Oklahoma Senator Tom Coburn listed 100 projects they had concerns about, with Hanford coming in at number ten on the list. Senator Murray and others defended Hanford, saying a great deal of cleanup was being accomplished with the stimulus funds. Although the McCain-Coburn report did not list it, other reports critical of the use of stimulus funds did frequently point to one Hanford project — a $300,000 aerial radiological survey of the BC controlled area. Critics called it a search for radioactive rabbit droppings. Hanford officials pointed out that the aerial survey was originally planned using ground crews, which would have cost an additional $700,000 and taken much longer. The aerial survey was used to find hot spots.

On top of the stimulus funding, DOE also got a boost in its regular funding. Congress passed an omnibus funding bill in March which replaced a continuing resolution that had maintained funding for DOE at fiscal year 2008 levels. The omnibus bill increased Hanford's budget for fiscal year 2009 to just under $2 billion. The Fiscal Year 2010 budget pushed Hanford funding to about $2.1 billion.

With work focused along the River Corridor, DOE offered initial plans for its strategy to clean up the Central Plateau. Under its 2015 vision, the plan was to reduce active cleanup on the site to no more than 75 square miles around the 200 Areas and surrounding land. DOE divided that area into inner and outer zones. The outer zone — about 55 square miles in size — was much less contaminated and DOE believed cleanup could be done to the same unrestricted surface use standards as land along the Columbia River. The outer zone included

"The stimulus funds create a major opportunity for Hanford to make additional cleanup progress beyond what would have been accomplished with the planned budget funding levels."

– Ecology Program Manager Jane Hedges, in a letter to DOE officials on budget priorities for Fiscal Year 2011. (July 14, 2009).

"It's hard to believe that Hanford could be known only as the Central Plateau in a few years. This is really what we've been working toward and it's really starting to crystallize."

– Dennis Faulk, U.S. Environmental Protection Agency. (*Tri-City Herald*, March 29, 2009).

about 180 waste sites — most of which were believed to have only shallow contamination. The remaining 20 square miles or less of the inner zone would be considered for industrial use. Some of that area would be required for permanent waste disposal. That area also included Hanford's tank farms and processing canyon facilities.

Hanford workers completed clean-up of the 618-7 burial ground and completed excavation of the 618-1 burial ground — both near the 300 Area. Both jobs presented fewer challenges than initially feared, as it was expected that some of the waste in both burial grounds might ignite when exposed to the air. There was a small flash of fire in one of the 618-7 trenches but it caused no injuries or spread of contamination. Workers dug up and removed from the 618-7 burial ground more than 180,000 tons of soil and contaminated materials, and more than 800 barrels which contained a variety of hazardous and radioactive materials. Work in the 618-1 burial ground turned out to be even less eventful.

Work shifted to a burial ground in the K Area and to a burial ground a few miles north of the 300 Area, called the 618-10 burial ground. The K Area burial ground included 16 unlined trenches and 11 waste silos, each four to 10 feet in diameter and as much as 32 feet deep.

"This is the most complex burial ground that we have tackled to date. There's a lot we don't know about it."

– Tom Foster, Washington Closure Inc, speaking about the 618-10 burial ground. (*Tri-City Herald*, June 4, 2009).

The 618-10 burial ground was used to dispose of 300 Area laboratory waste from 1954 to 1963. It was considered one of the highest risk burial grounds on site. Initial work would focus on precisely locating the 94 vertical pipe units that were used to dispose of highly radioactive wastes. Vertical pipe units were made by removing the tops and bottoms of 55 gallon drums and welding five of them together to form a long pipe that was then buried in the soil. The

Some buried waste drums at Hanford are badly corroded. ►

◀ *Testing of the Mobile Arm Retrieval System.*

burial ground also included 23 trenches. Many records of what was disposed at 618-10 were destroyed in the early 1990s.

Hanford's new tank farm contractor began work to retrieve waste from one of Hanford's aging single-shell tanks. Washington River Protection Solutions began retrieval work at tank C-110, which had 126,000 gallons of sludge remaining inside.

Testing of a new mechanical arm to assist with tank waste retrievals showed positive results. The Mobile Arm Retrieval System, or MARS, was larger and more robust than any other retrieval technology being used in Hanford's tanks. The telescoping arm rotated 360 degrees and reached as far as 40 feet, which enabled the arm to reach throughout the inside of even a million gallon Hanford tank. The MARS included a water cannon and high pressure nozzles to help break up the waste. Testing demonstrated the ability to break up substances similar to the three types of waste that had so far been the most difficult to mobilize. Using the MARS required cutting a 52 inch opening in the top of the tank for installation.

DOE, the Washington Department of Ecology and the U.S. Environmental Protection Agency (EPA) reached tentative agreement on new

▲ *DOE-Office of River Protection Manager Shirley Olinger.*

"Removing the waste from the single-shell tanks and upgrading the aging infrastructure in the tank farms is...key to providing tank waste feed to the Hanford vitrification plant in 2019."

– Shirley Olinger, DOE-ORP Manager. (DOE-ORP News Release, January 22, 2009).

"We've demonstrated that MARS can effectively reach and clean not only the tank floor but the tank wall and is capable of using its elbow-joint movement, plus its multi-axle wrist movement to reach around obstacles."

– Scott Saunders, Washington River Protection Solutions. (DOE News Release, October 14, 2009).

"We believe these changes reflect shared vision and priorities."

– Matt McCormick, DOE Assistant Manager of Central Plateau Cleanup, on proposed changes to the Tri-Party Agreement. (Associated Press, February 6, 2009).

"This was really the first time we had pretty serious budget repercussions we had to deal with. If we wanted to get that work along the river corridor done, we had to give relief somewhere else."

– Dennis Faulk, U.S. Environmental Protection Agency. (Associated Press, February 6, 2009).

"We are very pleased that this ruling confirms the enforceability of an important element of the Hanford cleanup schedule."

– Washington Attorney General Rob McKenna. (Washington Department of Ecology News Release, March 11, 2009).

"The pace of cleanup at Hanford is totally linked to the capabilities of ERDF."

– Dave Einan, U.S. Environmental Protection Agency. (*Tri-City Herald*, September 24, 2009).

cleanup milestones for portions of the Hanford cleanup. Some of the proposed new milestones would accelerate cleanup of contaminated groundwater and other cleanup activities — especially along the Columbia River. Some work in Hanford's Central Plateau would be delayed. The proposed changes drew mixed comments from the public.

The Ninth Circuit Court of Appeals affirmed the State of Washington's authority over mixed hazardous and radioactive transuranic waste buried at Hanford. The ruling affirmed a 2005 federal District Court ruling which had upheld a state regulatory order issued in 2003. That order required DOE to remove and process the equivalent of approximately 75,000 drums of buried waste at Hanford, which had been stored in unlined trenches since the 1970s.

Construction of two new waste disposal cells at ERDF was completed. That raised capacity of the disposal facility to about 11 million tons, with more than 8 million tons already disposed. Work soon began on the next expansion, using $100 million in stimulus funding, so capacity would be available when the new cells were filled in two to three years. The newest expansion would include two "super cells," twice the size of existing cells, and would increase the capacity by 50 percent to about 16 million tons of waste. Each super cell would be 1,000 feet long, 500 feet wide and 70 feet deep. Additional improvements at ERDF would include purchase of additional haul trucks, waste containers, bulldozers and water trucks, in anticipation of handling up to 600 waste containers per day.

Work to 'cocoon' the N Reactor began. It was the last of Hanford's nine plutonium reactors to operate and to shut down. A number of buildings were demolished, including by early summer, the familiar "golf ball." The 35 foot diameter structure was used to treat liquid flushed from the N Reactor piping system.

Rather than cocooning the K-East and K-West reactors, DOE began

Two new disposal cells were added to Hanford's Environmental Restoration Disposal Facility. ►

◀ *Excavation work next to the K-East Reactor.*

to explore the possibility of tearing both reactors down. DOE said its contractor was examining the technical and worker safety issues associated with going forward with demolishing both reactors.

By September, the once-leaky 1.2 million gallon fuel storage basin at the K-East reactor was gone, demolished by workers who filled more than 2,000 large containers with debris. With the basin out of the way, workers quickly began excavating contaminated soil.

Hanford workers successfully recovered about 200 gallons of Hexavalent chromium from a 45 year old pipeline which connected water treatment facilities at B and C reactors.

Hanford was suggested as a potential site for long-term storage of the nation's elemental mercury. DOE conducted an Environmental Impact Statement to assess Hanford and six other sites to store up to 11,000 tons of mercury. The Mercury Export Ban Act of 2008 prohibited the export of mercury from the United States beginning in 2013. The proposal to store mercury at Hanford was widely opposed by a variety of government and tribal nations in the region, mainly concerned about the mission interfering with the current cleanup or causing an environmental risk on its own.

DOE said it would not import Greater-Than-Class-C waste to Hanford before the WTP was operating. Hanford was one of several sites being considered for disposal of the highly radioactive waste, which would come mostly from commercial reactors. DOE said that even though this waste category was not included in an agreement with the States of Washington and Oregon, it would expand its moratorium on most waste coming to Hanford to include the Greater-Than-Class-C waste.

DOE released the draft Tank Closure and Waste Management Environmental Impact Statement. The document analyzed retrieval, treatment and disposal of Hanford's tank wastes; disposal of low-level and mixed low-level waste from Hanford and other DOE sites; and final decontamination and decommissioning of the Fast Flux Test Facility. The document examined eleven alternatives for potential tank closure actions. DOE's preferred alternative was to retrieve at least 99 percent of the

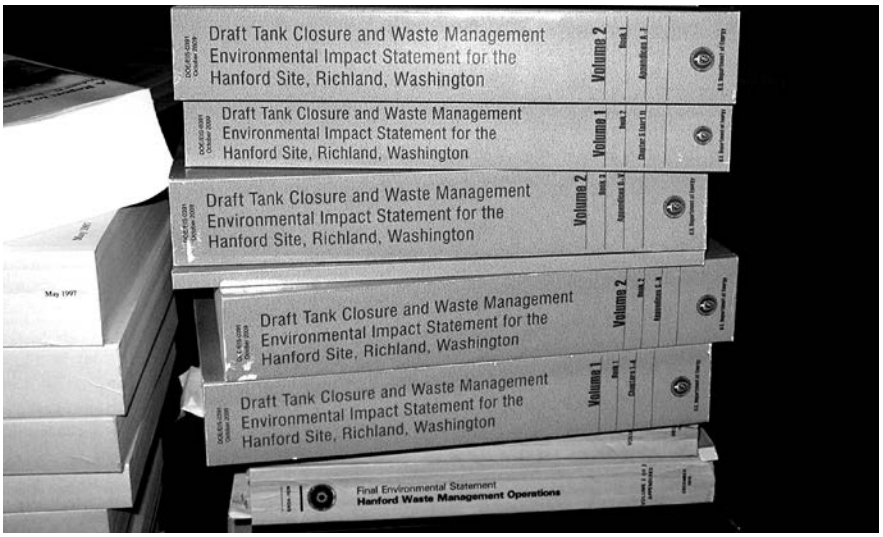
"Everything was about being able to get at those soils, and we're there. I know we're going to find a surprise there too, I just don't know what it is yet."

– DOE Richland Manager Dave Brockman, on the demolition of the K-East reactor fuel storage basin. (Associated Press, September 11, 2009).

"We would oppose any effort that would divert resources or focus from Hanford cleanup, or hinder the cleanup in any way."

– Letter from Ecology Director Jay Manning to the DOE EIS Document Manager. (August 20, 2009).

The draft Tank Closure and Waste Management Environmental Impact Statement. ►



tank waste; treat it through the WTP complex under construction; and "landfill" closure of the tank farms — where the emptied tanks would be filled with grout or some other material and left in place. The document did show that importing waste from other DOE sites for disposal at Hanford could significantly increase impacts to Hanford's groundwater.

EPA promoted Dennis Faulk as its Hanford Program Manager. He replaced Nick Ceto, who had taken a job with DOE.

Washington Governor Chris Gregoire named Ted Sturdevant as the Director of the Department of Ecology. He replaced Jay Manning, who had become Gregoire's Chief of Staff.

DOE again awarded its Mission Support contract for site support services, including security, fire protection and maintenance of roads and utilities. A team led by Lockheed Martin Integrated Technologies called Mission Support Alliance, LLC was awarded the contract in September 2008, but the award was protested by the losing contractor. The contract was valued at $3 billion over ten years (a five-year base period with options to extend for up to another five years). Mission Support Alliance took over support services in late August, following a three month transition.

DOE decided not to demolish an underground concrete structure near Hanford's F Reactor, as it was home to the largest known colony of bats in Eastern Washington. The structure, previously used to hold water for the reactor, had no chemical or radioactive contamination and was determined to be structurally sound. About 2,000 Yuma myotis bats used the structure primarily from March through October, although some year-round use also occurred.

A Hanford worker was seriously injured when he fell about 50 feet through an open hatch and hit a guardrail before landing on a concrete floor. The worker suffered serious leg and back injuries from the accident, which occurred in the 300 Area. DOE found that the work had not been fully analyzed for appropriate safety precautions and that workers became distracted after the job scope changed. DOE mandated a number of improvements, including substantive changes to fall protection and work

control processes. DOE reduced its payment to Washington Closure Hanford by up to $2.3 million because of the accident.

A groundbreaking ceremony was held to kick off construction of the largest groundwater pump-and-treat system at Hanford. The $80 million facility would remove multiple contaminants from groundwater beneath Hanford's 200 West Area. It could eventually be expanded to treat water from beneath the 200 East Area as well. The facility was expected to pump and treat as much as 2,000 gallons of groundwater per minute.

Expansions and upgrades of an existing pump-and-treat system in the K Area tripled its capacity. The system was designed to remove Hexavalent chromium from the groundwater. Treatment facilities in the H Area were also being expanded, and construction on upgraded groundwater treatment facilities in the D Area was expected to begin in 2010.

Work was underway to collect samples of groundwater that was "upwelling" into the Columbia River. It had previously been assumed that groundwater entered the river within the first six feet of the banks. New evidence indicated that some groundwater, containing chromium and other contaminants, was entering the river far from the shoreline in the deep areas of the river. An advanced probe was being used to collect samples from numerous areas to help make better informed cleanup decisions.

A ceremony was held in Richland in October to commemorate Cold War nuclear workers. The U.S. Senate had passed a resolution in May designating a national day of remembrance for Cold War nuclear workers.

Hanford completed transfer of about 2,300 canisters of plutonium and about a dozen packages of unirradiated nuclear fuel from the Plutonium Finishing Plant (PFP) to the Savannah River Site. The consolidation of surplus plutonium from Hanford and other DOE sites allowed Hanford to avoid some expensive security upgrades. Irradiated fuel from the Fast Flux Test Facility was moved from PFP to the Canister Storage Building. With the PFP vaults empty and the nuclear fuel in storage elsewhere, Hanford officials opened up the vaults to tours by reporters and community leaders.

"We're holding the line on groundwater contamination in this area and not letting it get to the Columbia River."

– DOE Richland Manager Dave Brockman. (DOE News Release, July 23, 2009).

"The gates are down at PFP."

– DOE Richland Manager Dave Brockman. (*Tri-City Herald*, December 18, 2009).

Oregon Hanford Cleanup Board Member Barry Beyeler of Boardman looks inside a now-empty plutonium storage compartment in a vault inside the Plutonium Finishing Plant. ▼

Employment at the Hanford Site was expected to peak in fiscal year 2010 at about 10,800 employees, according to new projections by DOE. The Tri-City Development Council had requested the estimates to help schools, counties and utilities with long-range planning. A large drop in employment was predicted when Recovery Act funding was spent by the end of September 2011.

A draft National Service Park study recommended against a multi-state Manhattan Project National Historical Park. The Park Service recommended only Los Alamos, New Mexico be made a part of the Manhattan Project Park. Other options considered included a multi-state National Park which would have included Los Alamos, Hanford's B Reactor, and facilities at Oak Ridge, Tennessee. The Park Service did support preserving Hanford's B Reactor as a museum, possibly with a Park Service role.

A Government Accountability Office (GAO) report found that work was stopped 31 times at Hanford's tank farms and vitrification plant over a nine year period to address safety or construction quality issues. The GAO was critical of DOE for having limited documentation on the work stoppages.

For the first year since 2000, Hanford made no shipments of trans-uranic waste off the site. With receipt of the stimulus funding, those shipments would resume in 2010.

Tank Waste Treatment

"Reaching the midpoint in the project is encouraging. Most of the tough technical issues are behind us and, while there will be challenges ahead, our progress to date gives us confidence in a successful completion."

– WTP Project Director Ted Feigenbaum. (DOE News Release, October 14, 2009).

Construction work continued on the WTP complex. Two massive shield doors were installed in the pre-treatment facility. The 22-ton steel doors were each 10 feet high, 11 feet wide and approximately eight inches thick. The shield doors would provide radiological protection to workers when the WTP was operational. Crews also installed two large mixing vessels in the low-activity waste vitrification facility, which would be used to mix dry glass-forming materials. By October, the WTP passed the 50 percent completion mark.

The GAO recommended that DOE explore several opportunities to reduce the cost of its tank waste cleanup program, including leaving varying amounts of residual waste in the tanks. The GAO said DOE had not systematically evaluated whether its tank waste cleanup strategy was commensurate with risks posed by the wastes.

Initial tests at DOE's pre-treatment engineering platform — a quarter-scale mock-up of a portion of the WTP's pre-treatment facility — confirmed that the facility should operate as expected.

Contractors also assembled a test platform to confirm the effectiveness of pulse jet mixers to mix tank waste in vessels in both the pre-treatment facility and the high-level waste vitrification facility. Mixing is essential to move waste from vessel to vessel and to ensure solids do not settle to the bottom of a vessel, which could raise several safety issues.

Tank waste volume at Hanford was reduced by nearly one million

gallons through use of the evaporator. This was the first evaporator run since 2007, and followed a series of upgrades to the 32-year old evaporator. Since 1977, the evaporator reduced waste volume by about 67 million gallons.

The State of Oregon joined litigation filed in November 2008 by Washington because DOE would not be able to meet a 2011 Tri-Party Agreement milestone to have the WTP operational. DOE would also not be able to meet numerous milestones related to the retrieval of waste from Hanford's single-shell storage tanks. Although an agreement in principle was reached, negotiations broke down after Washington and the U.S. Department of Justice could not agree on language that the state believed would make revised deadlines enforceable and Washington filed suit seeking enforceable deadlines for cleanup.

In August, Energy Secretary Steven Chu visited Hanford and joined with representatives of the federal government and the states of Washington and Oregon to announce a proposed settlement of the litigation. The proposed Consent Decree included 19 milestones for the WTP, including pacing milestones for each of the WTP's major facilities. DOE was required to hot-start the WTP by 2019 and achieve initial plant operations by 2022. DOE was also required to complete retrieval of waste from all C Farm tanks by September 30, 2014; retrieval of waste from nine additional single-shell tanks by September 30, 2022; and retrieval of waste from all single-shell tanks by 2040. All tank waste would be treated by 2047. In a separate Tri-Party Agreement package, DOE and its regulators agreed to new milestones to expand groundwater treatment on the Hanford Site.

Public comment on the proposed settlement agreement was somewhat mixed. While many recognized that the previous existing schedules were not achievable, there were some who were concerned that deadlines had been extended too far. The deadline for retrievals from all single-shell tanks was pushed back from 2018 to 2040, and treatment of all waste was pushed back from 2028 to 2047.

"It's our job to make storage space in the double-shell tanks."

– Rebecca Raven, 242-A Facility Operations Manager. (Washington River Protection Solutions News Release, May 21, 2009).

"This is a great day for Washington State, our neighboring State of Oregon, and the entire nation. It's a great day for the Columbia River... and for all the communities downstream from Hanford."

– Washington Governor Chris Gregoire. (August 11, 2009).

"We simply must step up to the challenges at Hanford to protect the Columbia River and the communities that depend on it. Today, we renew our commitment to get the job done and get it done right."

– EPA Administrator Lisa Jackson. (August 11, 2009).

Washington Governor Chris Gregoire and Oregon Governor Ted Kulongoski share a laugh while Washington Senator Maria Cantwell comments on the proposed tank waste settlement agreement. ▼

"This case has been caught on dead center for too long. Let's come up with something so we can proceed."

– Federal District Court Judge William Fremming Nielsen. (*Spokesman Review*, April 22, 2009)

"We do believe that some claims are more meritorious than others and should be settled. We will make individual offers. We will see if the plaintiffs find them appealing."

– Attorney Kevin Van Wart, who represents former Hanford contractors DuPont and General Electric. (Spokesman Review, April 22, 2009).

"The President has made clear that the Nation needs a better solution than the proposed Yucca Mountain repository. Such a solution must be based on sound science and capable of securing broad support, including support from those who live in areas that might be affected by the solution."

– (Proposed Budget of the U.S. Government, Fiscal Year 2010).

▲ *Energy Secretary Steven Chu.*

DOE dropped a proposal that was included in the draft Tank Closure and Waste Management EIS to potentially send some Hanford tank waste for disposal in the Waste Isolation Pilot Plant (WIPP) in New Mexico. DOE had said that waste in at least eight Hanford tanks, and possibly as many as 20, could be classified as transuranic, making it eligible for disposal at WIPP. DOE cited uncertainties in waste classification that led both New Mexico and Washington not to support the proposal.

Around the DOE Complex

Attorneys for former Hanford contractors said they were willing to offer cash settlements to some of the Hanford downwinders who blamed their health problems on past radioactive material releases from Hanford. The settlement offers would be made only to those downwinders who had received among the highest radiation doses. The offer came a few days after the judge overseeing the case admonished attorneys for not having yet reached some settlement.

The U.S. Senate confirmed Chu's nomination as Secretary of Energy. Ines Triay was later confirmed as Assistant Secretary for Environmental Management. Triay made her first visit to Hanford in July.

The GAO said DOE had taken steps to resolve weaknesses in its contract and project management. DOE's contract management had originally been designated as high-risk in 1990. The GAO said DOE had since met three of five criteria to be removed from the high-risk list, but would remain there due to concerns about DOE's ability to monitor and prove the effectiveness of measures it took to correct problems.

President Obama and Energy Secretary Chu said that new alternatives for dealing with the nation's high-level nuclear waste would be evaluated and that the Yucca Mountain site would not be used as a waste repository.

"The Department has legal and moral obligations to clean up the wastes left over from 50 years of nuclear weapons production...Cleanup of these materials is a complicated, expensive long-term project, but I pledge to you to do my best to accelerate these efforts in order to protect human health and the environment, and to return contaminated lands to beneficial use."

– Secretary of Energy Designate Steven Chu, during his confirmation hearing. (January 13, 2009).

2010

"Boy, oh boy, what a mess we created making those bombs. Now we have to fix it up."

– Former New Mexico Senator Pete Domenici and a member of the Blue Ribbon Commission on America's Nuclear Future, after touring Hanford. (*Tri-City Herald*, July 15, 2010).

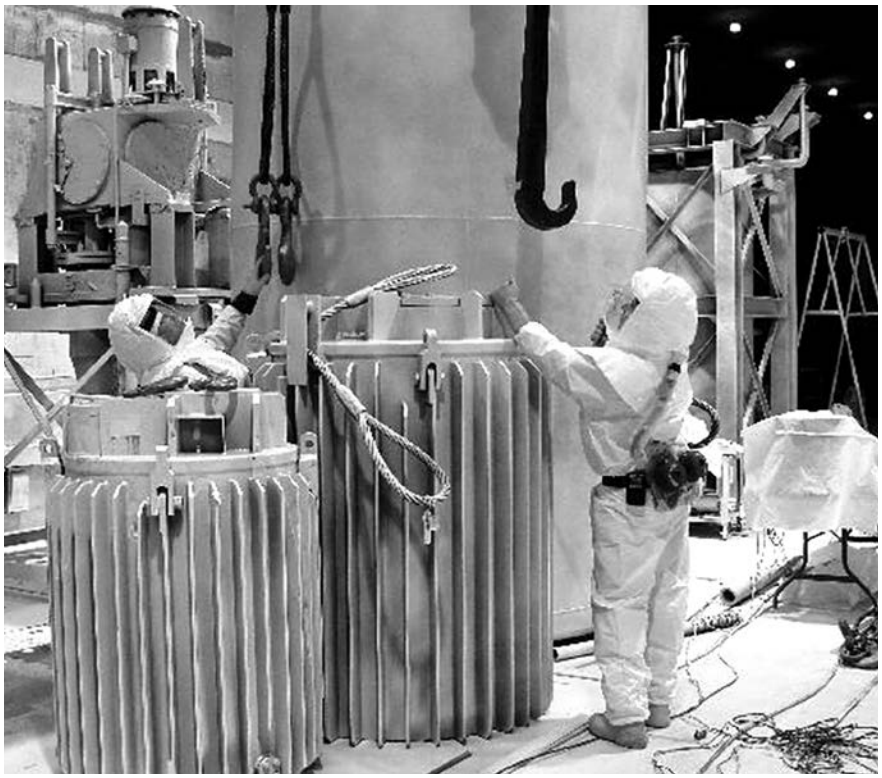
The Cleanup

It was full speed ahead for Hanford cleanup, as momentum from the federal stimulus money received by the U.S. Department of Energy (DOE) in 2009 carried into and through 2010.

Significant progress was made on the latest expansion of the Environmental Restoration Disposal Facility (ERDF). Two "super cells," twice the size of existing disposal cells, were under construction. Each super cell would be 1,000 feet long, 500 feet wide, and 70 feet deep. Super cell 10 was being excavated, while a liner was being constructed in super cell 9. The expansions, scheduled for completion in 2011, would increase disposal capacity by about 50 percent.

Construction of super cell 9 of the Environmental Restoration Disposal Facility ▼

Contaminated equipment is readied for placement into the U Plant processing cells. ►



"This is one of the most challenging cleanup projects at the Hanford Site, because the records don't tell us exactly what's buried here, but the information we do have indicates we'll encounter some of the most hazardous waste on the site."

– Mark French, DOE-Richland, referring to the 618-10 burial ground. (Washington Closure Hanford News Release, August 26, 2010).

"Each of the burial grounds we've cleaned up has been successively more challenging."

– John Darby, Washington Closure Hanford. (Washington Closure Hanford News Release, August 26, 2010).

Work began on removing some waste from the 618-10 burial ground, to help identify the types and extent of waste within the six acre disposal site. The burial ground, used from 1954 through 1963, contained waste from Hanford's 300 Area, including some highly radioactive waste. Workers dug test pits in burial trenches and retrieved test tubes, bottles, boxes, and several 55-gallon drums. Based on the results, estimates of the number of drums in the burial ground increased from 700 to 2,000.

Significant progress was made to prepare the first Hanford processing canyon for demolition. About 120 large contaminated pieces of equipment were moved from the U Plant deck and placed inside processing cells within the canyon. Void spaces within the cells would be filled with grout in 2011, and eventually the upper section of the facility would be collapsed and covered with an engineered barrier. Large chemical tanks and support facilities were also demolished or removed. DOE approved a plan for demolishing U Plant in 2005, but did not have funds available to move forward with the work. About $35 million of Recovery Act funds were being used on the project. U Plant was one of five chemical processing facilities at Hanford. It was being done first as it was considered the least contaminated.

Hanford workers completed cleanup at numerous waste sites in the 300 Area, beating a pair of Tri-Party Agreement (TPA) milestones in the process. Some of the work had begun as early as 2002. The work included six burial grounds and 11 surface sites. Nearly 500,000 tons of waste was removed from the waste sites, which were both inside and outside the 300 Area perimeter fence.

The cleanup footprint at Hanford was reduced by 115 square miles, with completion of work on the Arid Lands Ecology Reserve (ALE) and Rattlesnake Mountain. The cleanup included 24 excess structures and 362 debris sites. Neither area was part of Hanford's plutonium production work, but the U.S. Army maintained anti-aircraft defense installations and support facilities on ALE.

Hanford workers completed demolition of three fuel storage buildings, which had been used until the early 1950s for underwater storage of spent fuel rods prior to chemical processing. The three buildings, located just north of the 200 Area, each had a concrete roof, a heavily reinforced concrete and steel frame, and a basin. Twelve associated waste sites were also remediated.

An interim barrier was constructed over the entire TY tank farm in the 200 West Area. Made of modified asphalt, the interim barrier was designed to prevent precipitation from percolating into the soil and further spreading contaminants already in the soil. TY farm was constructed in 1951 and contained six underground 750,000 gallon single-shell tanks. Five of the six were classified as assumed leakers. Precipitation collected on the barrier would be funneled to a nearby evaporation basin. The asphalt was modified with a polymer to make it waterproof and to weather without cracking.

More than six football fields worth of concrete, once part of the K-Reactor water treatment facilities, were demolished using $17.6 million of Recovery Act funds. The facilities totaled more than 380,000 square feet of concrete structures — most of which was disposed at ERDF.

▲ ***This truck was retrieved by helicopter from a ravine on the Arid Lands Ecology Reserve.***

"Recovery Act funding put the project years ahead of the original schedule for demolition."

– Kurt Kehler, CH2M Hill, on work at the K Area. (DOE News Release, October 28, 2010).

Demolition of water treatment facilities in the K Area. ▼

"We have overcome some very difficult circumstances in preparing for this transfer, including very high radiation and contamination levels associated with some of the old equipment that had to be removed."

– Mark Lindholm, single-shell tank retrieval and closure manager. (DOE News Release, January 12, 2010).

"At some point you have to buckle down and push a retrieval effort to completion no matter how hard it is."

– Steve Pfaff, DOE's Office of River Protection. (*Tri-City Herald*, January 13, 2010).

"We have developed robotic arms at Hanford for many years but arms that would fit into the tanks through available risers were too small to do the job. The robotic arms that were robust enough to do the job wouldn't fit into the tank."

– Chris Kemp, DOE's Office of River Protection. (DOE News Release, December 20, 2010).

Some progress, tempered by new challenges, characterized the tank waste retrieval program during the year. Retrieval activities at tank C-104, a 530,000 gallon single-shell tank, were halted on two occasions when workers called a stop to the work due to repeated instances of workers smelling chemical vapors and seeking medical care. Some areas within and near the tank farms were roped off and additional chemical monitors were installed. Later in the year, the exhaust stacks were raised to help better disperse vapors. After about 200,000 gallons of sludge was removed, leaving about 60,000 gallons to go, the pump hit an obstruction in the sludge. Efforts to move the obstruction were initially unsuccessful, and work shifted to nearby tank C-111. That work was later stopped as workers were unable to dissolve a hardened crust within the tank.

Two operating campaigns of Hanford's evaporator reduced the volume of waste in the double-shell tanks by 480,000 gallons, creating additional space to allow tank retrievals to continue.

New technology to help with future retrievals was being readied for service. A next generation of "Foldtrack" underwent testing at Hanford's Cold Test Facility. The Foldtrack fits through a 12 inch opening in a tank and reconfigures into a mini-bulldozer with a high pressure water jet. An earlier version threw a track shortly after beginning operation in April 2008 in tank C-109. The newer version included several enhanced features.

A 55-inch hole was cut into the top of tank C-107 to allow later installation of a large robotic arm called the Mobile Arm Retrieval System. Workers first had to excavate six feet of soil off the top of the tank to access the tank itself. Workers used high pressure water and a fine grit of garnet to cut through the 15 inches of concrete and steel rebar.

Workers prepare to remove a large plug cut from the top of tank C-107. ►

DOE's tank farm contractor and Hanford Challenge, a citizen's oversight group, requested an independent assessment of the chemical vapor problems. The review was sponsored by the Hanford Concerns Council, which handled worker health and safety issues. The review found that vapor protection improvements had been made by the contractor, but also identified further opportunities for improvement. Those improvements included evaluating the effectiveness of raising the height of tank ventilation stacks; capturing vapor emissions with equipment such as scrubbers; continuing to test and implement new vapor detection instruments; and collecting and analyzing data to support medical monitoring and expand worker awareness of potential symptoms.

DOE told the National Park Service that Hanford's B Reactor should be included in any Manhattan Project National Historical Park. In a letter from Energy Assistant Secretary Ines Triay, she urged the Park Service to partner with DOE in order to best tell the story of the Manhattan Project, and include B Reactor and property in Oak Ridge, Tennessee with Los Alamos, New Mexico in a proposed Manhattan Project National Park. In a draft report, the Park Service had previously indicated an interest only in Los Alamos, citing the cost of multiple sites and potential hazards from radioactive materials in B Reactor.

Hanford's D Reactor passed its first five-year checkup. In the first entry to the reactor since it was sealed five years earlier as part of the Interim Safe Storage or "cocooning" of the reactor, nothing out of the ordinary was found. The door was welded shut once again and would be checked again in 2015.

Work progressed on waste site remediation and cocooning of N Reactor. Demolition exposed the reactor face, which would be covered when the cocooning was completed.

◄ *Work continued to prepare N Reactor for Interim Safe Storage.*

"DOE will maintain them, preserve important resources at these sites, ensure visitor and employee safety and request necessary funding from Congress to do so in the future."

– Letter from Energy Assistant Secretary Ines Triay to Jon Jarvis, Director of the National Park Service. (May 13, 2010).

"Dismantling the reactor core is not as much of a priority right now as other cleanup projects on the site, but it is still something DOE is considering."

– Geoff Tyree, DOE. (*Tri-City Herald*, December 17, 2010).

"At the end of the day we have lost our humanity when we forget about the workers."

– Glenn Podansky, DOE's Chief Health, Safety and Security officer. (*Tri-City Herald*, February 17, 2010).

DOE spent a good part of the year considering whether to dismantle the K-East Reactor, rather than cocoon it. Removing the reactor would have allowed access to contaminated soil beneath the reactor. Excavating too close to the reactor could make it unstable. The dismantlement of a research reactor at DOE's Brookhaven Site in New York provided some lessons in how to dismantle the K-East Reactor. In July, DOE amended its Record of Decision to allow for dismantlement. An engineering and cost analysis compared tearing down the reactor with other options, including cocooning it and hauling it away in 75 years. Tearing it down was identified as the preferred and cheapest alternative (about $83 million), and the best way to ensure cleanup of the contaminated soil before it could migrate to the river. The reactor's 175-foot high exhaust stack was taken down in July, through use of explosive demolition. By December, DOE decided to move forward with cocooning the reactor rather than dismantling it in the near future.

DOE prepared a preliminary project execution plan to remove sludge from the K-West basin. The plan outlined beginning sludge removal at the earliest by August 2013 and completion between December 2014 and December 2015. Cost of the project was estimated at $267 million.

The Hanford Advisory Board submitted a letter to DOE stating that previous DOE commitments for an independent review of Hanford's beryllium protection program had not been met and that the new beryllium program was not entirely adequate. Beryllium was widely used at Hanford and many site building had beryllium contamination. Exposure could cause lung disease. DOE conducted a full-scale inspection of the program and found that while the Site had taken some positive steps towards better protecting its workers, more could be done. A plan of corrections required that buildings be thoroughly assessed for beryllium contamination; more in-depth epidemiological studies; better training; and more oversight.

Past Hanford workers who may have been exposed to radiation and developed certain cancers automatically qualified for $150,000 in compensation from the federal government. The new rule, which took effect in January, expanded the number of workers eligible for automatic compensation.

Shipments of transuranic waste resumed from Hanford in March. No waste had been shipped from Hanford to the Waste Isolation Pilot Plant (WIPP) since September 2008. Recovery Act funding allowed Hanford to resume WIPP shipments about four years earlier than planned. In June, Hanford began shipping waste to the Idaho National Laboratory for processing, prior to it being shipped on to WIPP. The Idaho facility had automated compacting equipment that allowed disposal space at WIPP to be used more efficiently. Between WIPP and Idaho, Hanford sent 113 shipments of waste during the year.

A new groundwater pump-and-treat system was completed and began operation near Hanford's D and DR Reactors. The system was

designed to remove Hexavalent chromium from the groundwater and had a capacity of treating about 20 million gallons per month. Another pump-and-treat system was under construction at the nearby H Reactor area. Together, the two systems were designed to remediate large chromium plumes that had spread in and between the two reactor areas.

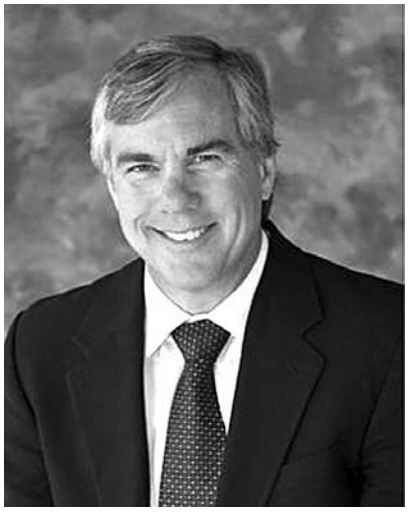
At the N Area, DOE proposed to expand a chemical barrier used to immobilize strontium in the groundwater. The 300 foot test area showed good results. DOE proposed to expand the barrier to 2,500 feet. The barrier was made by injecting chemicals to form calcium phosphate, also called apatite. When the strontium hit the barrier, much of it then bound to the soil.

Changes to the TPA were approved for both transuranic waste and to integrate soil, facility and groundwater cleanup in Hanford's Central Plateau. The new changes included setting a deadline of 2030 to remove all legacy transuranic mixed waste from Hanford. There had not previously been a deadline for when to remove that waste. Nearly 30 new milestones were created for the Central Plateau, including first-ever milestones for cleanup of contamination in the deep vadose zone.

Changes in Hanford leadership were announced in July. Matt McCormick replaced Dave Brockman as Manager of the DOE Richland Operations Office. Brockman assumed the position as Manager of the DOE Office of River Protection. Shirley Olinger, who had served in that role, became the Associate Principal Deputy for Corporate Operations.

A former DOE Senior Policy Advisor said the United States had about three times more waste plutonium than the last government estimate 14 years ago. Robert Alvarez, a senior scholar at the Institute for Policy Studies, said Hanford had about a third of the plutonium waste, some 4.4 tons. The plutonium waste was mixed

◀ *A truck hauling transuranic waste climbs Cabbage Hill, east of Pendleton, on its way to a disposal site in New Mexico.*



▲ *DOE-Richland Manager Matt McCormick.*

"As DOE embarks on its effort to clean up its most contaminated area in the Central Plateau at Hanford, it is becoming clear that plutonium-contaminated waste will pose one of the most serious risks to the human environment for years to come."

– Robert Alvarez, Institute for Policy Studies. (Plutonium Wastes from the U.S. Nuclear Weapons Complex, July 7, 2010).

▲ *Russell Jim shares the perspective of the Yakama Indian Nation with the Blue Ribbon Commission.*

"I challenge you to take full responsibility for your decisions, for your outcomes here because countless generations will be living with the consequences. Many people won't remember your names in 1,000 years, but they will know what you have decided."

– Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation, addressing the Blue Ribbon Commission on America's Nuclear Future. (Meeting transcript, July 14, 2010).

"There is no clearer reminder than Hanford that responsible plans for waste management must be in place before the waste is produced."

– Washington Governor Chris Gregoire, addressing the Blue Ribbon Commission on America's Nuclear Future. (Meeting transcript, July 15, 2010).

within Hanford's tank waste, buried in the soil, and held up in facilities. Alvarez said DOE planned to leave about 1,500 pounds of plutonium in the soil at Hanford.

Members of the Blue Ribbon Commission on America's Nuclear Future visited Hanford and heard from a variety of officials about Hanford. The commission visited a tank farm, toured the Waste Treatment Plant (WTP) site, viewed the cesium and strontium capsules, and saw storage containers for spent nuclear fuel at the Canister Storage Building. All of these wastes were or had been considered for disposal in a deep geologic disposal facility. The Blue Ribbon Commission was charged with recommending how best to move forward with a process to dispose of these and other highly radioactive wastes, including commercial spent nuclear fuel.

Heart of America Northwest filed suit against DOE over a 2004 decision to send radioactive waste to Hanford. It said environmental analysis contained in a draft Environmental Impact Statement released in 2009 was based on flawed information. Heart of America Northwest was asking that the 2004 decision be declared invalid.

DOE recommended in a draft environmental study that a commercial storage site in Texas be used to store the nation's excess mercury. Hanford had been one of seven sites under consideration for the activity. DOE favored the Texas site because it was remote, sparsely populated, had an existing rail line, few nearby bodies of water, the necessary permits and an existing building that could be used on a short-term basis.

DOE issued a preliminary notice of violation against Washington Closure Hanford in connection with a 2009 incident where a worker fell 50 feet through an open hatch. The notice cited violations for

fall protection, ladder safety, and construction safety, but did reduce a previously announced $2.3 million fine by $600,000 and praised the contractor's prompt response to the accident and changes it made in its safety processes and procedures.

High levels of radioactivity were discovered beneath a hot cell in the 300 Area. The 324 Building contained five highly contaminated hot cells, which were built to allow Hanford personnel to work with radioactive materials without being exposed to radiation. During preparations to demolish the three story building, a visible breach was discovered in the stainless steel liner at the floor of the sump. Upon further exploration, an apparent localized high level of radioactive material was discovered beneath the hot cell. A large spill into the cell of concentrated cesium and strontium was referenced in a report as having occurred in 1993. Radioactivity was measured at 8,900 rads per hour, about 10 times the lethal dose on contact.

Tank Waste Treatment

Technical and safety issues associated with Hanford's WTP project were front and center during much of the year.

An engineering manager for the WTP alleged that safety and design concerns were being suppressed and that he was removed from his job by Bechtel National for raising concerns about future safe operations of the WTP. In a letter to the Defense Nuclear Facilities Safety Board (DNFSB), Walter Tamosaitis said his dismissal had an adverse effect on the safety culture in the overall project which would likely not be easily repaired. Bechtel officials disagreed with his allegations.

The DNFSB launched an investigation. DOE also began a safety

"This is extremely high radioactivity. Nothing else compares in the river corridor."

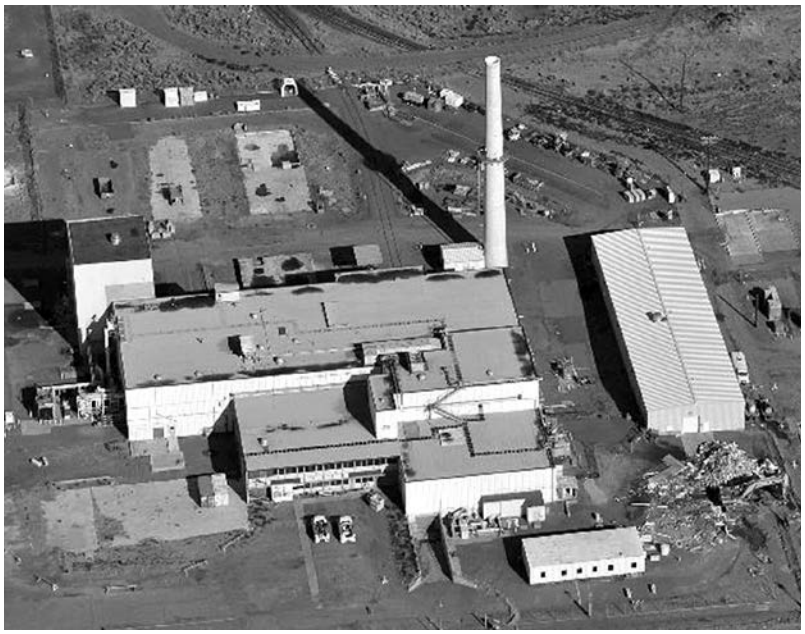
– Mark French, DOE-Richland. *(Tri-City Herald*, November 18, 2010).

"There has been an immediate chilling effect on the Project safety culture that has already caused Project team members to question me whether they should raise safety and Project design concerns in the future."

– Letter from Walter Tamosaitis to the DNFSB. (July 16, 2010).

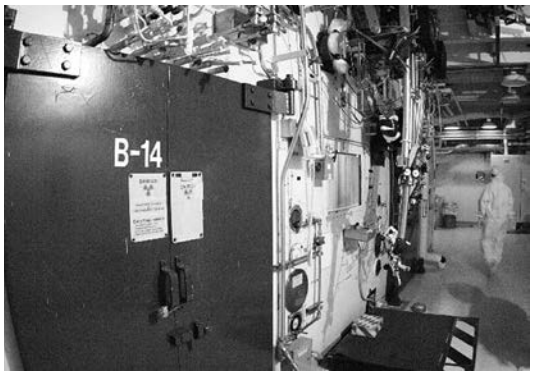
"Our nuclear safety and quality culture encourages all employees to have a questioning attitude. We expect internal staff and external technical experts to identify and raise safety, design and operational issues."

– Bechtel statement. (*Tri-City Herald*, July 28, 2010).



◀ ***High levels of radioactivity were discovered in a hot cell below the 324 Building, in Hanford's 300 Area.***

The hot cell is located behind these shielded doors. ▼



"In order to effectively complete the safe cleanup of the Cold War legacy sites, our workers must have confidence that concerns can be raised without retribution."

– Energy Assistant Secretary Ines Triay. (*Tri-City Herald*, August 6, 2010).

"To the maximum extent possible, solutions must be accommodated before commissioning. A learn-as-we-go philosophy does not seem prudent for this facility."

– DNFSB Chair Peter Winokur. (Meeting transcript, October 7, 2010).

"The Board believes that the testing and analysis completed to date have been insufficient to establish, with confidence, that the…mixing and transfer systems will perform adequately at full scale."

– Federal Register. (December 27, 2010).

"This cleanup will take generations of hard work and tough, pragmatic decisions. Today's settlement means we can now move ahead on one of the biggest environmental challenges we face as a nation."

– U.S. Environmental Protection Agency Region 10 Administrator Dennis McLerran. (TPA News Release, October 6, 2010).

investigation through its Office of Health, Safety and Security. DOE's Office of Inspector General began an investigation of the allegation of retaliation, but then turned that over to the Department of Labor. Tamosaitis filed suit in Benton County Superior Court.

The safety investigation by DOE's Office of Health, Safety and Security found that Bechtel National had established the framework for a strong safety culture at the WTP, but that improvements could be made. The review found that most WTP personnel who were interviewed expressed that their managers "encouraged a questioning attitude" and that they were "comfortable with raising safety concerns." Some employees did say that the environment at the WTP discouraged reporting of safety concerns and there was fear of retaliation. The review recommended Bechtel perform a systematic assessment of its processes for identifying and resolving nuclear safety issues.

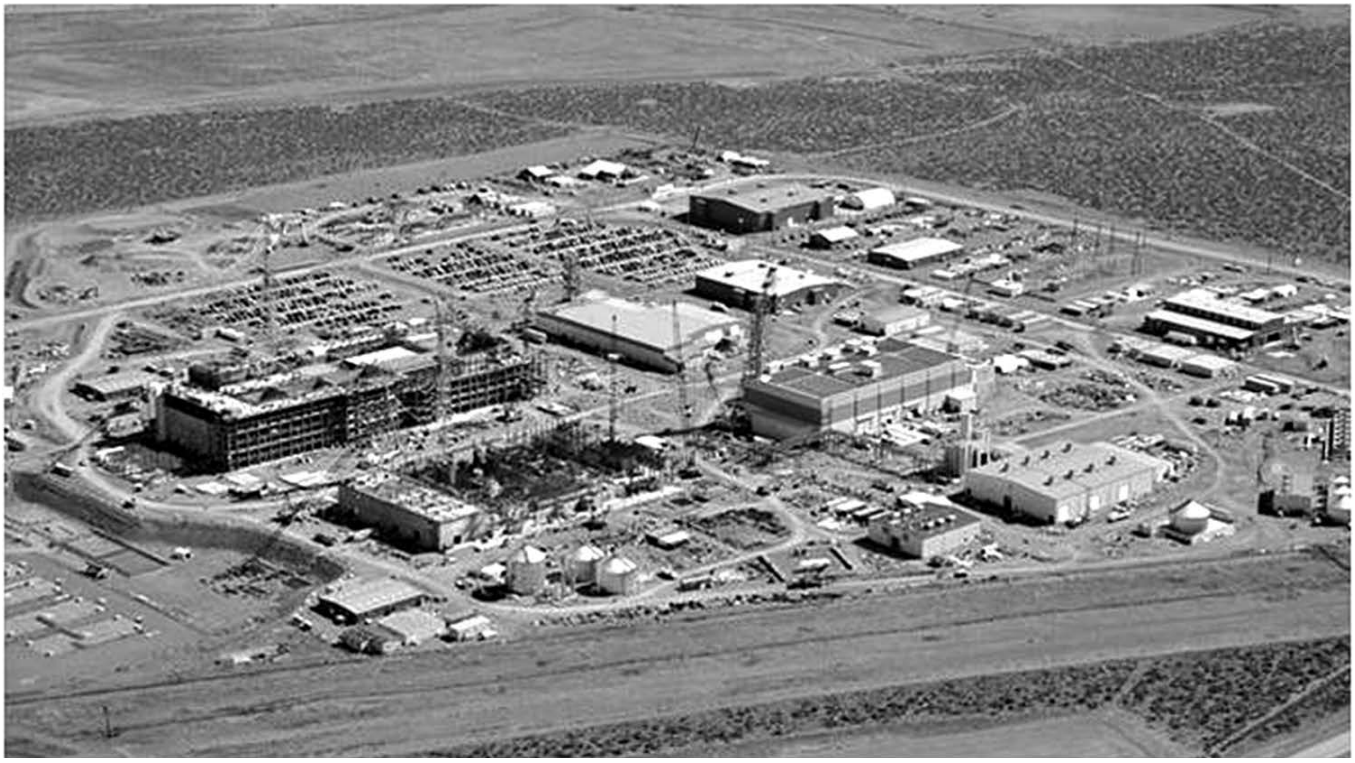
DOE closed out a list of 28 technical issues at the WTP, while acknowledging that additional testing was needed to assure that waste could be kept adequately mixed to avoid potential buildup of flammable gas or even a nuclear criticality. A national review panel agreed with DOE's conclusion that resolution of the 28 technical issues — raised by a panel of experts in 2006 — was adequate for design and construction work to be completed.

The DNFSB however, meeting in Kennewick in October, raised concerns that the WTP could be commissioned before several key technical issues were fully resolved. They identified waste mixing and hydrogen control strategy, among other issues.

The DNFSB later issued a formal recommendation to DOE to develop a large-scale test plan to address the mixing issue, including development of waste simulants that enveloped the complete range of physical properties of Hanford's tank waste. The Board expressed concern that small-scale testing and modeling had not adequately addressed the issues.

The U.S. District Court in Spokane approved and entered a judicial consent decree that imposed a new enforceable schedule for retrieving and treating Hanford's tank waste. The agreement settled litigation filed against DOE by the State of Washington in 2008, and joined by the State of Oregon in 2009. A tentative agreement was announced in August 2009, but resolution of the final details and providing the public an opportunity to comment delayed finalizing the agreement to October. The consent decree included pacing milestones to keep the construction of the WTP on schedule; a requirement to complete retrieval of all waste from the C Tank farm in 2014; treatment of tank waste beginning in 2019 with full operations in 2022; complete retrieval of all single-shell tank waste no later than 2040; and complete all tank waste treatment no later than 2047.

DOE announced a goal to develop "transformational technologies" to potentially complete the tank waste treatment missions at Hanford and Savannah River years earlier and for billions of dollars less than the current baselines indicated. The Washington Department



▲ *The Waste Treatment Plant in May 2010*

of Ecology later reiterated in writing that "glass from vitrification of some kind is the only acceptable primary waste form" for Hanford tank waste.

Construction continued at the WTP. Two 125-ton low-activity melter assemblies for the low-activity waste vitrification facility were successfully transported about 800 miles from Ogden, Utah. A specially configured heavy-haul transporter was used to bring the melters to Hanford.

Around the DOE Complex

Energy Secretary Steven Chu announced the formation of a Blue Ribbon Commission on America's Nuclear Future. The Commission was tasked with providing recommendations for developing a safe, long-term solution to managing America's spent nuclear fuel and high-level radioactive waste. Former Congressman Lee Hamilton and former National Security Advisor Brent Scowcroft were named as co-chairs of the 15-member Commission. The Commission was instructed not to consider Yucca Mountain as an option for waste disposal.

President Obama's decision to terminate the Yucca Mountain repository program sparked litigation, regulatory challenges, and fights in Congress. DOE filed a request with the U.S. Nuclear Regulatory Commission (NRC) in early February to suspend Yucca Mountain's license application, and followed with a motion to withdraw the application. The State of Washington filed a motion with the NRC to intervene in the licensing proceeding, claiming that neither DOE nor the NRC had the legal authority to terminate the licensing process pre-

"We're done with Yucca (Mountain). We need to be looking at other alternatives."

– Carol Browner, White House Energy Advisor. (*Las Vegas Sun*, January 29, 2010).

"We vigorously oppose any efforts to remove this facility from consideration and are prepared to staunchly defend the interests of Washington in identifying a safe repository for the millions of gallons of hazardous waste our state currently houses."

– Washington Attorney General Rob McKenna. (Washington Attorney General News Release, March 3, 2010).

The Obama Administration's attempts to terminate the proposed nuclear waste repository at Yucca Mountain drew strong opposition. ►

maturely. The NRC initially put the licensing proceeding on hold. The NRC's Atomic Safety and Licensing Board then ruled that DOE did not have authority to stop the process, a ruling the full NRC would yet have to consider.

Three Tri-City business leaders filed suit in February, claiming the President was in violation of the Nuclear Waste Policy Act by discontinuing work at Yucca Mountain. The State of Washington filed suit in April. South Carolina also filed suit. The District of Columbia Circuit Court of Appeals initially issued a stay on the litigation, pending a ruling by the NRC. After waiting unsuccessfully for the NRC to act, the Court lifted the hold on the litigation and placed it on an expedited schedule.

DOE began to examine ways to help ease the abrupt end of Recovery Act funding, looking at training and placement programs for workers. DOE promised to explore early retirement incentives, to keep some of the new workers brought in with the Recovery Act funding.

A U.S. Government Accountability Office (GAO) study of DOE's use of Recovery Act funds showed that most DOE cleanup projects appeared to have met cost and schedule targets, although a third of the projects had not. The GAO found that measuring the impact of Recovery Act funding on job creation and DOE's cleanup program had been a challenge for DOE.

"Since the state of Washington is so enthusiastic about underground storage of spent nuclear fuel, perhaps their governor and their citizens will volunteer to have the nation's nuclear waste dump located within their borders."

– Nevada Governor Jim Gibbons. (Associated Press, April 14, 2010).

"You are the historians, the storytellers of America."

– Hanford historian Michelle Gerber, at a public hearing, in which she stated B Reactor should be part of a Manhattan Project National Park and that the National Park Service should partner with the U.S. Department of Energy to tell the story. (*Tri-City Herald*, January 22, 2010).

2011

"That's why we got so much money – because we could pull it off."

– Jon Peschong, Recovery Act project manager for DOE-Richland, speaking about the nearly $2 billion in Recovery Act funds received by Hanford. (*Tri-City Herald,* October 15, 2011).

The Cleanup

With nine months of Recovery Act funding available through September 30, considerable cleanup progress was made at Hanford before the funds ran out. As expected, the end of the program led to significant layoffs.

Workers dug a deep excavation near Hanford's C Reactor, in pursuit of Hexavalent chromium that had migrated into the soil. Typical excavations at Hanford had occasionally gone as deep as 35 feet. The C Reactor dig was about 85 feet, requiring sloped sides and roads to allow equipment to be driven to the bottom. Hexavalent chromium was extensively used at the reactors and all of the reactor areas had groundwater contaminated with chromium. The "big dig" at C Area was intended to remove large amounts of chromium in the soil before it could get to the groundwater.

Two new super cells at Hanford's Environmental Restoration Disposal Facility (ERDF) were completed seven months ahead of schedule and $16 million under budget. It was the fourth and largest expansion of the facility and increased the disposal capacity to 16.4 million tons.

◀ *Workers dug a large pit near the cocooned C Reactor in pursuit of Hexavalent chromium (and later dug a second large pit as well).*

Workers removed and demolished the dome of the Plutonium Recycle Test Reactor. ►

"Hanford was entrusted with almost $2 billion in funding, and the progress being made is very evident here at (ERDF)."

– Dave Huizenga, Acting Energy Assistant Secretary for Environmental Management. (DOE News Release, August 15, 2011).

"As we demolish buildings at Hanford, we often talk about how we're changing the skyline. With the removal of the dome, there won't be much of a skyline left in the 300 Area."

– Dan Elkins, Washington Closure Hanford. (Washington Closure Hanford News Release, January 2011).

▲ *Contaminated soil is loaded in the BC Control Area.*

Additional upgrades were also completed, including improvements to the leachate collection system, construction of additional entrances, roadways and disposal ramps, and purchase of additional trucks and containers. In all, about $100 million in upgrades was paid for with Recovery Act funding.

The iconic dome of Hanford's Plutonium Recycle Test Reactor in the 300 Area was removed as part of the reactor's eventual demolition. The 67-ton dome was lifted off in a single piece and lowered to the ground. It was then cut into pieces and disposed at ERDF. The concrete walls that supported the dome were also demolished. The reactor and reactor building extended about 80 feet underground. Demolition work on that was expected to take a few years. The reactor operated from 1960 to 1969.

Nearly half a million tons of contaminated soil was removed from the BC controlled area and taken to ERDF for burial. More than 20,000 truckloads of contaminated soil were hauled from the 140 acre area just south of the 200 East Area. DOE determined that another 1,600 acres within the BC controlled area did not require cleanup, although additional "hotspots" throughout the area would require remediation.

Cleanup work at Hanford's 118-K-1 Burial Ground shifted to underground silos, which contained some highly radioactive waste. The silos were corrugated metal pipes, 10 feet in diameter and 25 feet deep. The 16 acre burial ground was about half a mile from the Columbia River and contained 16 trenches and 11 silos.

Work also began to exhume waste from the 618-10 burial ground, one of the most hazardous burial grounds on the site. Nearly two years of preparation and characterization work in the burial ground preceded the work to retrieve the waste. Workers initially uncovered concrete-lined drums and hundreds of bottles containing liquids. The burial ground, located about six miles north of the City of Richland,

received laboratory waste from the 300 Area between 1954 and 1963.

The U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency issued the first Record of Decision for dealing with soil contamination in Hanford's Central Plateau. The soil was contaminated through disposal of liquid wastes containing plutonium and other contaminants. The federal agencies chose a combination of alternatives for the 21 individual waste sites in four areas — retrieving, treating, and disposing of some contaminated soil; extracting contamination through an air-handling system; and leaving some contaminants in place under a soil barrier. The Hanford Advisory Board, the State of Oregon, and Native American tribes objected to earlier proposals to leave most of the waste in place. Based on these comments, the agencies did agree to remove some plutonium from the most contaminated sites, but less than was recommended.

Work began on removing 196 "pencil tanks" from the Plutonium Reclamation Facility, part of the Plutonium Finishing Plant complex. The skinny tanks were shaped to prevent an uncontrolled nuclear reaction and ranged from three feet to 22 feet long. Dozens of entries into the heavily-contaminated facility were required to repair the 40 year-old crane, needed for the removal of the pencil tanks. Workers also began to demolish the plutonium vault complex, where weapons-grade plutonium had been stored until 2009.

The heat exchanger building attached to N Reactor was cocooned and work continued on cocooning the reactor building. Workers also continued their work to clean up 140 waste sites and six miles of piping.

"The Board advises the U.S. Department of Energy to get as much plutonium out of these waste sites as possible" (and to the Waste Isolation Pilot Plant, for geologic disposal).

– Hanford Advisory Board Advice #247. (April 1, 2011).

Workers load a decommissioned glove box from the Plutonium Finishing Plant. ▼

▲ *Inside the 100-HX groundwater treatment facility.*

"Crews normally drill 50-60 groundwater wells per year at the site. Thanks to Recovery Act funding, our contractor drilled about 300 wells in two years, significantly expanding our capability to remove groundwater contamination."

– Briant Charboneau, DOE-Richland. (DOE News Release, May 26, 2011).

A new groundwater pump-and-treat system began operation near Hanford's H Reactor. It was the largest groundwater treatment system along the Columbia River, with a treatment capacity of 800 gallons per minute. Along with a similar but slightly smaller system that began operation late in 2010 near the D and DR reactors, the two systems were designed to work together to treat a large Hexavalent chromium plume in and between the two reactor areas. The system in the H Area used 31 extraction wells and over 61 miles of piping to bring groundwater to the treatment facility.

Hanford Site workers surpassed goals for drilling new groundwater wells. About 300 wells were drilled — some 40 more than had been planned. The work was also completed four months ahead of schedule. The wells supported efforts to detect, monitor and treat groundwater. The new wells ranged in depth from 60 to 520 feet deep.

Underground processing cells in Hanford's U Plant were filled with grout to prepare the canyon for demolition. In 2010, about 120 large contaminated pieces of equipment were placed inside the processing cells within the canyon. Void spaces within the cells were filled with grout, encapsulating the equipment and debris. Eventually, the upper section of the facility would be collapsed and covered with an engineered barrier.

DOE's Inspector General found that work with Recovery Act funds in Hanford's tank farms was on schedule and under budget, which allowed for additional work to be done. DOE's Office of River Protection received $324 million in Recovery Act funding for upgrades within the tank farms.

By October, as the last of the Recovery Act projects wound down at Hanford, both DOE officials and regulators called the program a success. Most of the projects finished on or under budget and on or ahead of schedule. Recovery Act goals at Hanford included adding the equivalent of 2,500 full-time jobs, shrinking the footprint of the Hanford Site cleanup, and reducing the overall costs of the cleanup. Hanford officials said all three goals were met.

DOE estimated that about 10,000 people had some role in the

Workers drilled dozens of eight-inch-wide holes through U Canyon's five-foot-thick exterior walls to enable grout to reach all void spaces in the canyon. ►

Recovery Act work, including workers who manufactured goods and materials used at Hanford. Peak Recovery Act employment was estimated at 3,861 early in 2011. The Hanford Site cleanup footprint was reduced from 586 square miles to about 200 square miles, primarily because of completion of cleanup of former buffer areas which now formed the Hanford Reach National Monument. During the two and a half years of Recovery Act funding, workers tore down 67 buildings and structures; dug up 73 waste sites; drilled 303 new groundwater wells; nearly completed two plants to treat contaminated groundwater; expanded ERDF; and removed 130 plutonium-contaminated glove boxes from the Plutonium Finishing Plant.

As Hanford came to the end of its Recovery Act funding, the result was a substantial number of layoffs. Hanford workers had hoped that some of the layoffs could be avoided through an early retirement incentive program, but DOE informed Hanford contractors in January that it would not approve the program. In all, about 2,000 workers were either laid off or chose voluntary layoffs. Various layoffs began in March, but the majority occurred at the end of the federal fiscal year, at the end of September. The layoffs affected a mix of new and experienced workers. Some workers with enough seniority were able to take other jobs through a "bump-and-roll" system. Hanford started the year with about 12,000 employees.

DOE officials were concerned that the initial failure by Congress to pass a budget for fiscal year 2011 would result in additional cuts. In the spring, Congress approved a continuing resolution for the remainder of the year that cut DOE's overall cleanup funding by $380 million from the amount requested by the President, but Hanford ended up with relatively minor cuts and continued work pretty much as planned. Uncertainties associated with the fiscal year 2012 budget also caused some concern. Congress passed a budget late in December that cut the Richland budget by about $20 million. The Office of River Protection received about $50 million more than its fiscal year 2011 funding. Overall the site received about $2.2 billion. It forecast a need of at least $2.9 billion for fiscal year 2013.

A new report estimated the cost of completing the Hanford cleanup at a minimum of $115 billion. The Hanford Lifecycle, Scope, Schedule and Cost Report — required by the Consent Decree agreement signed in 2010, projected completion of cleanup in 2060 and maintaining institutional controls over the site through 2090. The report demonstrated a need for funding of more than $3 billion annually for four separate years prior to 2020 — a large increase over current funding and an amount considered unlikely by Hanford regulators and the local DOE offices.

Workers resumed tank waste retrieval from tank C-104 in February. Previous attempts to empty the tank of waste had been plagued by pump problems and an obstacle hidden within the sludge. By May, pumping was halted as operators no longer saw progress. About 4,900 gallons of waste remained — much of which resembled sand

"We got tremendous bang for our buck. We showed we are a value to the taxpayer."

– Dennis Faulk, U.S. Environmental Protection Agency. (*Tri-City Herald,* October 15, 2011).

"Layoffs like this are obviously harmful to workers and are counterproductive to the ongoing efforts to hire and retain new workers as many at Hanford near retirement."

– Representative Doc Hastings of Washington. (*Tri-City Herald*, January 20, 2011).

"It may scare Congress, but it points out the need for cleanup here... and how much work needs to be funded to protect the environment and human health."

– Ron Skinnarland, Washington Department of Ecology. (*Tri-City Herald,* August 13, 2011).

"MARS is an innovative tool in our waste retrieval box and we are excited to put it into service. We believe the new system will be a game changer for us…"

– Kent Smith, Washington River Protection Solutions. (Washington River Protection Solutions News Release, October 11, 2011).

"This project addresses a complicated, one-of-a-kind waste form with uniquely challenging nuclear chemistry, and managing a project of this magnitude and complexity…is no easy matter."

– DOE Inspector General Audit DOE/IG-0848. (February 2011).

"There is no better place to tell a story than where it happened, and that's what national parks do. The National Park Service will be proud to interpret these Manhattan Project sites and unlock their stories in the years ahead."

– National Park Service Director Jonathan Jarvis. (U.S. Department of the Interior News Release, July 13, 2011).

and fine gravel. The tank was evaluated to determine whether additional retrieval technologies would be needed.

The Mobile Arm Retrieval System (MARS) was installed in tank C-107 in July and began operations during the fall. The system — the largest retrieval technology inserted into a Hanford tank — showed significant progress almost immediately. Retrieval work then shifted between C-107 and C-108, which shared a common pipe and pumped waste to the same double-shell tank.

DOE's Inspector General found that a failed attempt to move sludge from the K Basins cost $43 million without producing any results. The project, managed by Fluor Hanford, was canceled in 2007, after three years of effort to design and fabricate a modular system to retrieve, oxidize and assay the sludge, and then grout it in 55 gallon drums. The IG concluded the project was not effectively managed.

There was widespread opposition voiced against the idea of disposing of highly radioactive "Greater-Than-Class C" waste at Hanford. In public meetings in both Pasco and Portland to receive comments on a draft Environmental Impact Statement, the general sentiment expressed was that Hanford had plenty of waste of its own and certainly did not need more waste. The draft EIS named Hanford as one of several sites under consideration for disposal of the waste, much of which would come from the future decommissioning of commercial nuclear power plants.

Secretary of Interior Ken Salazar recommended to Congress that Hanford's B Reactor be part of a national historical park to commemorate the Manhattan Project. An environmental assessment released to Congress supported DOE's continued management and operation of B Reactor, with the Park Service providing museum-quality interpretation and engineering. Salazar toured the B Reactor in September. Legislation was still needed to create the national park and to detail how a multi-state park would be operated. In addition to B Reactor, the park would include sites at Los Alamos, New Mexico and Oak Ridge, Tennessee.

Two locomotives and two cask cars that were used to haul irradiated nuclear fuel from Hanford's reactors to its processing

Left photo: An old railroad engine delivered to B Reactor for display. Right photo: Two railroad tank cars being buried in ERDF. ▼

canyons were delivered to B Reactor for preservation and public display. The locomotives were built in 1948 and acquired new by the Atomic Energy Commission, which previously operated Hanford. Twelve additional railcars were disposed in ERDF.

The Tri-City Development Council (TRIDEC) requested 1,341 acres of Hanford land for economic development. The City of Richland, the Port of Benton and Benton County joined in the request for the land, located just north of the Richland city limits. TRIDEC said this was the first of what would be several requests for various Hanford lands for future development to help offset future Hanford employment reductions. The Confederated Tribes of the Umatilla Indian Reservation said treaty rights should provide them with the first opportunity to acquire Hanford lands made available, and said it would object to any transfer of land that affected the tribe's ability to exercise their treaty rights.

The U.S. House of Representatives unanimously passed a bill which allowed access to the summit of Rattlesnake Mountain. Washington Congressman Doc Hastings introduced the bill, which would require the Secretary of the Interior to provide public access to the mountain's summit for educational, recreational, scientific, historical, cultural and other purposes. Since the federal government acquired Hanford in 1943, the eastern slope of Rattlesnake Mountain had mostly been closed to the public. Native American tribes consider the mountain as sacred land and opposed opening up the summit to public use. The bill went to the Senate but was relegated to committee.

Scott Samuelson was named Manager of DOE's Office of River Protection (ORP). Samuelson came to Hanford with more than 26 years of federal service in DOE's Nuclear Energy, Science, and Defense Programs. J.D. Dowell had served as Acting Manager following the retirement of Dave Brockman in early January.

A defense authorization bill included language to renew the ORP through at least 2019. The language was added by Congressman Hastings, who had initially added language to create ORP in 1998.

A lawsuit filed by Heart of America Northwest in 2010 regarding DOE proposals to bring more waste to Hanford was dismissed by a federal judge. Judge Edward Shea ruled that Heart of America members were not being harmed because no waste was coming to Hanford so they did not have standing to bring a lawsuit.

Heart of America executive director Gerald Pollet was appointed to the Washington State Legislature, representing King County's 46th Legislative District in the House of Representatives. Pollet said he would continue his involvement with the Hanford cleanup.

A DOE video explaining Hanford's history and the current cleanup won a Northwest Emmy Award. The first chapter of *The Hanford Story* was produced by Lockheed Martin Creative and Strategic Services.

DOE met its first Tri-Party Agreement milestone to ship transuranic waste off of the Hanford Site. DOE was required to ship 1,000 cubic yards of waste off site prior to September 30. DOE made 104 shipments of waste during the calendar year. Shipments went both to the Idaho

"Lands no longer needed for cleanup should not be locked away by the federal government into perpetuity."

– Letter from Congressman Doc Hastings to Energy Assistant Secretary Ines Triay. (May 31, 2011).

"The Hanford land rush was anticipated and is coming to pass…The CTUIR takes its responsibility to care for the Creator's resources very seriously and the Hanford site contains some of the resources that are most precious to the people of the CTUIR."

– Letter from Leo Stewart, Interim Chair CTUIR Board of Trustees, to DOE Richland Manager Matt McCormick. (July 1, 2011).

▲ ***DOE-ORP Manager Scott Samuelson.***

National Laboratory for repackaging and directly to the Waste Isolation Pilot Plant for disposal.

The Defense Nuclear Facilities Safety Board (DNFSB) was critical of the safety oversight program at Hanford's Waste Encapsulation Storage Facility. The facility holds about one third of Hanford's radioactivity, contained in 1,936 stainless steel canisters and stored underwater to shield workers from radiation. The DNFSB said the oversight program of CH2M Hill Plateau Remediation Co. failed to identify a number of safety and maintenance deficiencies.

DOE's Inspector General recommended a nationwide triage system to prioritize cleanup work at Hanford and other DOE sites, saying the current cleanup strategy was not sustainable under likely budget reductions. The Inspector General recommended only high-risk, high-priority activities be funded and said costs could be further reduced by remediating to "brownfield" rather than "greenfield" standards.

DOE agreed to settle claims brought by 139 people with thyroid disease who claimed radioactive material released from Hanford caused their illnesses. It was the largest settlement in Hanford downwinder litigation that had stretched for more than 20 years. Each plaintiff received $5,683. Nearly 1,400 plaintiffs remained in downwinder litigation at Hanford.

Tank Waste Treatment

The "safety culture" at Hanford's Waste Treatment Plant (WTP) was a topic of considerable focus. Hanford whistleblower Walt Tamaosaitis, a former engineering manager for the WTP, raised the issue in 2010, and it dominated much of the discussion about the WTP throughout the year.

DNFSB Chair Peter Winokur addressed the issue at a Congressional hearing in April — saying the Board was investigating several related issues, centered around whether WTP employees believed they could raise safety issues without reprisal. The Board had earlier drawn DOE's ire when it conducted an investigation into possible witness tampering by DOE at the Board's 2010 meeting in Kennewick. DOE objected and questioned the Board's authority to conduct such an inquiry.

A DNFSB investigation concluded that a flawed safety culture existed at the WTP, and that it had a substantial probability of jeopardizing the tank waste treatment mission. The investigation found a chilled atmosphere adverse to safety, and found that expressions of technical dissent affecting safety at WTP — especially those affecting schedule or budget — were discouraged, if not opposed or rejected without review. The report stated that corrective actions would only be successful and lasting if championed by the Secretary of Energy.

DOE requested the Board's investigative record, including all transcripts and interview notes, to better understand the concerns. The Board declined the request, stating the importance of maintaining con-

"The investigative record demonstrates that both DOE and contractor project management behaviors reinforce a subculture at WTP that deters the timely reporting, acknowledgement, and ultimate resolution of technical safety concerns...It is essential that workers feel empowered to speak candidly without fear of retribution or criticism."

– DNFSB Recommendation 2011-1. (June 9, 2011).

▲ *WTP construction workers install rebar walls at the top of the high-level waste facility.*

fidentiality of communications from concerned employees and the public and said DOE had access to sufficient information to validate the DNFSB findings.

Energy Secretary Steven Chu responded that while DOE "fully embraces" the objectives of the Board's specific recommendations, DOE did not agree with all of the findings. Chu disagreed that DOE or contractor management suppressed technical dissent on the WTP project. He also said that DOE's independent investigations into WTP safety culture reached very different conclusions than that of the DNFSB. Still, Chu outlined a number of initial steps to address the Board's recommendation, including continued personal engagement by Chu and Deputy Secretary Daniel Poneman; an independent review of safety culture across the entire DOE complex; Safety Conscious Work Environment training for DOE-ORP and Bechtel managers; and enhanced reporting mechanisms for safety-related concerns.

DOE and Bechtel established a team of executive-level nuclear safety experts to conduct a separate, independent comprehensive review of the nuclear safety and quality culture at the WTP. An employee survey was part of the review, which also included interviews with about 90 DOE and contractor employees. In contrast to the DNFSB findings, the review found no widespread evidence of a chilled atmosphere adverse to safety and no widespread evidence that DOE and contractor management suppressed technical dissent. It blamed delays in resolving some technical and safety issues as contributing to a perception of a chilled atmosphere and suppression of dissent. The report did stress the importance of maintaining a strong safety culture at the WTP project. The report was sharply criticized by Hanford Challenge, a worker advocacy group.

While the review was underway, a second WTP official filed a

"In the spirit of continual improvement, DOE accepts the Board's recommendations to assert federal control to direct, track, and validate corrective actions to strengthen the safety culture at WTP."

– Letter from Energy Secretary Steven Chu to DNFSB Chair Peter Winokur. (June 30, 2011).

"The conduct of the DNFSB oversight activities…had the unwanted effect of instigating a series of hostile reactions and interactions that have burdened the normally constructive relationships among the Board, DOE and its contractors."

– Independent Safety and Quality Culture Assessment Team report. (December 1, 2011).

"The business of fixing the safety culture has to begin with an acknowledgement that there has been suppression and a chilling effect on reporting concerns. The report dismissed existing problems by concluding that any safety culture issue at the WTP is the fault of the whistleblowers themselves and the groups that support them, like the DNFSB."

– Tom Carpenter, Executive Director of Hanford Challenge. (Hanford Challenge News Release, December 1, 2011).

"DOE is committed to a strong and sustained safety culture, where all employees are energetically pursuing the safe performance of work, encouraging a questioning work environment, and making sure that executing the mission safely is not just a policy statement but a value shared by all."

– Memo from Energy Secretary Chu and Deputy Secretary Poneman to all DOE managers. (December 5, 2011).

federal complaint, alleging she was discriminated against for being a whistleblower on nuclear safety issues. Donna Busche, the manager of environmental and nuclear safety at the plant, filed the complaint with the Department of Labor against Bechtel National and its prime subcontractor, URS Corp.

DOE submitted an implementation plan to address the three DNFSB sub-recommendations. The plan noted that DOE's Response Team found some technical staff at the WTP hesitant to raise safety or technical concerns that might affect project schedule or cost, and that some staff believed the Employee Concerns Program was ineffective. DOE said it would revise the Bechtel contract performance evaluation plan and project performance measures to include safety culture elements. Secretary Chu would also address employees and managers at a town hall meeting.

WTP technical issues also received considerable focus. The primary issue was whether waste could be sufficiently mixed to prevent plutonium particles from collecting in the bottom of vessels — potentially causing a criticality or the generation of hydrogen gas. Controlling flammable gas in other parts of the plant's processing systems and piping was also an area of concern. Plans were being developed for large-scale integrated tests to better understand how well the mixing pumps would perform.

Construction of the WTP continued. The overall project hit the 60 percent completion mark during the summer. That included engineering, procurement, construction, and start-up and commissioning-related activities. Engineers also completed the civil, structural and architectural design for the high-level waste facility. Among the specific accomplishments, a 102-ton shield door and a pre-assembled piping module, which contained 3,900 feet of stainless steel piping, were placed into the pre-treatment facility.

DOE suggested that a phased start-up of waste treatment could

Aerial of the Waste Treatment Plant. ▶

◀ *A crane lifts a 19-ton piping module into the WTP's pre-treatment facility.*

be possible in late 2016 — three years ahead of the 2019 schedule. Dale Knutson, DOE's WTP Project Director, said DOE was exploring a strategy that would include removal of large particles and removal of radioactive cesium in a new facility in or near the tank farms. The large particles and cesium would be returned to the tank while the remaining waste would be sent to the low-activity waste vitrification facility. That would allow DOE to start immobilizing some of Hanford's tank waste and give them operating experience and lessons that could be applied to start-up of the far more complex high-level waste and pre-treatment facilities.

"I think it's a very doable plan. It gives us a sense of urgency."

– Dale Knutson, DOE WTP Project Director. (*Tri-City Herald*, February 10, 2011).

By November, DOE notified Washington and Oregon that they were at risk of not meeting some key WTP construction deadlines set just a year prior, but provided no additional details.

A DOE Construction Review Project determined that it was "increasingly unlikely" that the project could be completed at its approved budget of $12.26 billion. Potential funding reductions in the fiscal year 2012 budget could further exacerbate the project's cost and schedule challenges. The review identified a potential cost overrun of $800-900 million based on currently identified risks. That overrun could be partially offset by $350 million of savings achieved through a phased start-up of the facilities.

Around the DOE Complex

A massive 9.0 earthquake and tsunami devastated the northeast coast of Japan, creating a nuclear disaster at the Fukushima Daiichi nuclear power plant complex. Although the three reactors operating at the time of the earthquake shut down, the resulting tsunami damaged electrical systems and pumps and plant operators lost the ability to remove decay heat. The fuel in the reactors melted, leading to a release of radioactive materials into the environment. Hydrogen explosions

"Experience in the United States and in other nations suggests that any attempt to force a top-down, federally mandated solution over the objections of a state or community – far from being more efficient – will take longer, cost more, and have lower odds of ultimate success."

– Blue Ribbon Commission Draft Report. (July 29, 2011).

"There is no guarantee that a more acceptable or less costly alternative will be identified; termination could instead restart a costly and time-consuming process to find and develop an alternative permanent solution."

– GAO Report GAO-11-229. (April 8, 2011).

▲ *Acting Energy Assistant Secretary David Huizenga.*

damaged the three reactor buildings and an adjacent reactor building.

A wildfire — the largest in New Mexico history — threatened DOE's Los Alamos nuclear laboratory. The laboratory was closed and the town evacuated. The fire burned more than 156,000 acres before it was controlled.

The Blue Ribbon Commission on America's Nuclear Future released its draft report, which recommended a new consent-based approach to siting future nuclear waste management facilities; a new organization dedicated solely to implementing the waste management program; and access to funds already paid by nuclear utility ratepayers. The Commission further recommended prompt efforts to develop one or more geologic disposal facilities and one or more consolidated interim storage facilities.

A Government Accountability Office report to Congress said DOE shut down the Yucca Mountain repository for policy reason — not technical or safety reasons. The report concluded that DOE's actions might make it more difficult to find a willing repository host. DOE strongly disagreed with most of the conclusions in the report.

The U.S. Court of Appeals for the District of Columbia Circuit Court dismissed a lawsuit filed by the State of Washington and others over Yucca Mountain. The court ruled the lawsuit premature to determine whether the Obama Administration acted illegally to abandon the proposed Yucca Mountain repository. Washington filed a new lawsuit — seeking to compel the U.S. Nuclear Regulatory Commission to proceed with consideration of the Yucca Mountain license application.

Energy Assistant Secretary Ines Triay stepped down from her position as the head of DOE's environmental cleanup program. Triay cited family health issues in her decision. She was replaced by Dave Huizenga, who had been working on international nonproliferation issues with DOE's National Nuclear Security Administration. Secretary Chu also moved the cleanup program under the direction of the undersecretary for nuclear security, Thomas D'Agostino. Both D'Agostino and Huizenga visited Hanford before the year was out.

(Bringing more waste to Hanford) "runs counter to everything that Oregon and Washington, Northwest tribes and health advocates have sought to achieve in taming a Hanford nuclear beast that menaces underground water, the Columbia River, and human and wildlife populations nearby."

– *The Oregonian* Editorial. (May 18, 2011).

2012

"Tank AY-102 construction records detail a tank plagued by first-of-a-kind construction difficulties and trial-and-error repairs. The result was a tank whose as-constructed robustness was much lower than intended by the double-shell tank designers."

– Tank 241-AY-102 Leak Assessment Report. (November 7, 2012).

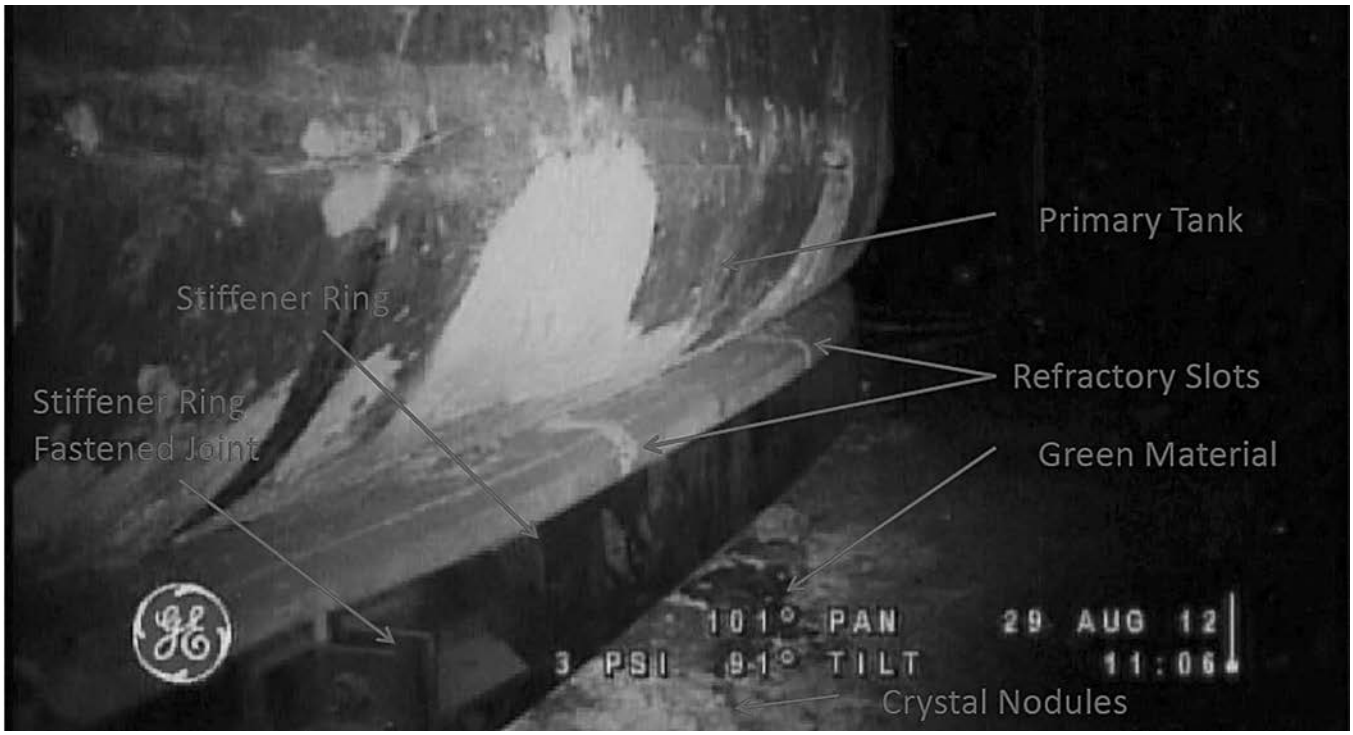
The Cleanup

The discovery of a leaking double-shell tank was a clear reminder that Hanford's waste storage facilities have a finite life. A routine video surveillance of tank AY-102 detected potential leaked tank waste in the annulus — the space between the two tank walls. Two spots of apparent waste were initially discovered in August. Video inspections from additional locations around the tank found another suspicious spot. Samples confirmed some of the material in the annulus was consistent with the type of waste in the tank. One area of waste was estimated to cover about three square feet, less than one-half inch thick and it was slowly changing. The other area — on the opposite side of the tank — covered about 40 square feet,

"For the first time in the history of Hanford, we have confirmed that waste has leaked from the inner, or primary, shell of a double-shell tank."

– Message to employees from Washington River Protection Solutions President Mike Johnson. (October 22, 2012).

The leak in tank AY-102 was initially discovered through a routine video surveillance. ▼



▲ *The annulus of tank AY-102 during construction.*

Tank AY-102 prior to it being covered with eight feet of dirt. ►

"This changes everything. It is alarming that there is now solid evidence that a Hanford double-shell tank has leaked."

– Tom Carpenter, Hanford Challenge Executive Director. (Hanford Challenge News Release, August 17, 2012).

"Based on the most recent inspections…there is indication that the inner tank is slowly leaking."

– DOE News Release. (October 22, 2012).

"The (Hanford Advisory) Board advises DOE to begin the process immediately to build additional tank capacity at Hanford."

– Hanford Advisory Board Consensus Advice #263. (November 2, 2012).

"A significant flammable gas accident would have considerable radiological consequences, endanger personnel, contaminate portions of the tank farms, and seriously disrupt the waste cleanup mission."

– DNFSB Recommendation 2012-2. (September 28, 2012).

about one-quarter inch thick. A third spot was determined to be soil.

AY-102 was the first double-shell tank at Hanford. It was constructed in the late 1960s and went into service in 1971. Analysis of the construction records showed numerous problems with rejected welds and other issues. It had also received high-heat waste in the late 1990s. AY-102 held about 650,000 gallons of liquid waste and 150,000 gallons of sludge. There was no indication the tank had leaked into the environment. The U.S. Department of Energy (DOE) greatly increased its monitoring of the tank and began to examine other double-shell tanks. DOE's tank farm contractor estimated the leak started sometime after January 2007 and was between 190 to 520 gallons of waste — much of which evaporated — leaving 20 to 50 gallons of drying waste.

The Defense Nuclear Facilities Safety Board (DNFSB) said DOE was not doing enough to prevent a buildup of flammable gases in Hanford's double-shell waste storage tanks. The DNFSB recommended DOE upgrade ventilation on each of Hanford's 28 double-shell tanks to ensure the removal of flammable gas from the tanks' headspace. Flammable gases are generated within Hanford's tanks. Some of the gas leaves the tanks through filtered vents. Some gas becomes trapped within the crust of the waste, but could be released in potentially hazardous concentrations.The DNFSB had raised the issue in 2010 and was not satisfied with DOE's progress to this point.

For the first time in more than a decade, Hanford workers retrieved waste from multiple tanks. As the year began, work was underway in tanks C-112 and C-108. Washington River Protection Solutions used a modified sluicing system to help break through a hard crust of waste in C-112. That had mixed results and retrieval work stopped in April. Workers had better success in using water soaks and a chemical solution to remove a hard layer remaining at the bottom of C-108. That tank was emptied by late spring — the first tank to be completed in five years. Work resumed in tank C-107 in March, using

the Mobile Arm Retrieval System (MARS) — a robust robotic arm. By summer, work was underway in three tanks — C-107, C-104 and C-109. Retrieval work on C-104 and C-109 was declared complete in September – the ninth and tenth tanks emptied. Work later stopped on C-107 when a pump used to provide liquid waste to the MARS failed. Construction activities were also done to prepare for retrieval from three other C Farm tanks. Retrieval began in one of them — C-101 — before the end of the year.

Washington Closure Hanford solicited bids to remove highly contaminated soil from beneath the 324 Building in Hanford's 300 Area. The plan was for a contractor to design remotely operated equipment to be installed in the hot cell where the spill occurred. The floor of the hot cell would be removed and then contaminated soil dug up and transferred to adjoining hot cells to be grouted for later disposal. The vulnerability of that contamination sitting in the soil was highlighted by two separate water pipeline failures in the area. The first occurred in May and spilled roughly 20,000 gallons of water. An excavator broke a pipe in August, leading to a spill of about 150,000 gallons of water. In neither case did the water reach the contaminated soil beneath the 324 Building.

"What is needed now, and over the next few years, is consistent and sustained momentum in these retrieval efforts."

– Dieter Bohrmann, Washington Department of Ecology. (*Tri-City Herald,* March 12, 2012).

Tank farm workers during retrievals of tank C-104. ▼

"This re-sequencing of work will allow completion of the increased work scope, maintain our work efficiencies and continue to maximize cleanup efforts to reduce the risks to the Columbia River."

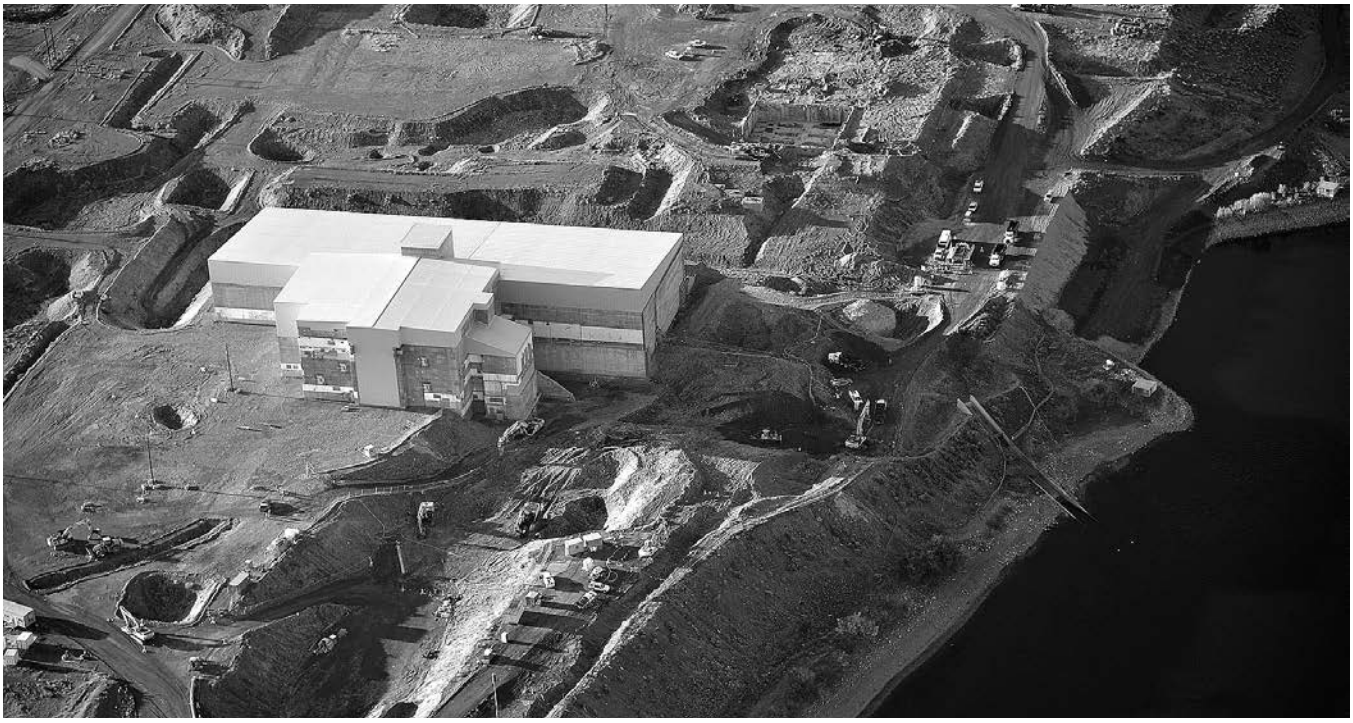
– Memo from Washington Closure President Carol Johnson to employees. (*Tri-City Herald*, May 25, 2012).

DOE later said that tight budgets would prevent some projects along the River Corridor — including the 324 Building — from being completed by the end of 2015, which had been the goal of its "2015 Vision." DOE said that additional contamination found at some locations along the river would extend some of the work and also require more funding. In addition to the 324 Building, work would be deferred on the 618-11 burial ground. Excavation of the trenches at the 618-10 burial ground would continue, but work to remove more highly radioactive waste from vertical pipes buried in the soil would be delayed. Until sludge could be removed from the K West Basin, cleanup work could not be completed in the K Area, including cocooning of the two reactors. Setting a schedule for demolition of Hanford's chemical processing canyons was postponed by a decade. Several Tri-Party Agreement Milestones were renegotiated to reflect the delays.

N Reactor was successfully put into Interim Safe Storage. More than 100 support structures were demolished and nearly 120 waste sites cleaned up as part of the process. The reactor was demolished to its solid concrete shield walls, all openings were sealed with concrete or steel plating, and a new roof was built over both the reactor and the adjacent heat exchange facility — which made the "cocoon" around N Reactor considerably larger and visually different than the five reactors previously put into Interim Safe Storage.

At the K-East Reactor, DOE said it would cocoon the reactor differently, by constructing a steel shell-like structure over the reactor instead of adding a roof to the existing reactor building walls. DOE said the change would reduce fall risks and radiological risks to workers, while still isolating the reactor core from people and the environment. That work would be done in future years.

N Reactor after cocooning. ▼



◀ *Hanford's F Area, July 2012.*

The F Area became the first reactor area to achieve final cleanup, with the reactor cocooned, 112 support buildings and structures demolished, and 88 waste sites cleaned up. Groundwater contamination in the area would continue to be monitored, though DOE planned no active treatment.

Near the C Reactor, workers dug to groundwater to remove Hexavalent chromium from the soil. The source of the contamination was assumed to be from a 1966 incident when a transfer pump was left running. Workers dug 85 feet deep and removed more than 2.3 million tons of soil, concrete and scrap metal. Another large plume of Hexavalent chromium was discovered to the west of the dig. A high-voltage power line was relocated to allow excavation of the second plume in order to keep it from reaching the groundwater and eventually the river. That excavation also went to groundwater.

The largest and most sophisticated groundwater treatment plant at Hanford went into operation in August. The 200 West Groundwater Treatment Facility was designed with multiple technologies to remove

"A transfer pump moving sodium dichromate solution from storage to the system feed tank was inadvertently left running which caused the feed tank to overflow to the drain. About 140,000 pounds of sodium dichromate was released to the river before the pump was shut off."

– Battelle Northwest Contamination Release Report. (September 1966).

◀ *Hanford workers dug to groundwater near C Reactor in pursuit of a plume of Hexavalent chromium.*

both radioactive materials and chemical contaminants. The initial focus was on removing technetium 99, nitrates and carbon tetrachloride. Other treatment systems would later be added to address other contaminants. The treatment capacity of the new facility was 108 million gallons per month. The facility was the first in the DOE complex to receive a Leadership for Energy Environmental Design gold certification for reduced energy use and for meeting certain recycling goals during construction and operation.

DOE issued a Record of Decision for cleaning up groundwater in the southern part of the 200 West Area — primarily through use of the new pump-and-treat facility. It called for meeting cleanup levels for technetium 99 in 15 years and for uranium and chromium in 25 years. Meeting cleanup levels for nitrates was estimated to take 35 years and for carbon tetrachloride 125 years — both through a combination of pump-and-treat and monitored natural attenuation.

DOE said a new form of resin used in groundwater pump-and-treat systems along the Columbia River to strip Hexavalent chromium from the groundwater proved to be much more effective than originally planned. The new resin held about 15 times more chromium than the previous resin and was expected to save up to $1.6 million per year. After successful use at the groundwater treatment facility near D and DR Reactors, the resin was being used at all five chromium pump-and-treat systems.

DOE said it had taken sufficient actions to contain or remediate Hexavalent chromium at each of the reactor areas — consistent with a Tri-Party Agreement target milestone due December 31, 2012. DOE said soil remediation to remove sources of chromium and significant expansion of its pump-and-treat systems had greatly reduced the amount of chromium getting to the Columbia River.

Hanford workers removed the first of the highly radioactive sludge from the K-West Basin. About half a cubic yard of sludge was moved in five shipments to Hanford's Canister Storage Building. The sludge resulted from the corrosion of 2,100 tons of spent nuclear fuel stored in the K Basins, along with sand and dirt that blew into the basins. About 37 cubic yards of sludge remained to be moved away from the K Area.

About 90 stray pieces of irradiated fuel that had been found in the sludge and in burial grounds near eight of Hanford's reactors were also moved to the Canister Storage Building.

"The groundwater in close proximity to the Columbia River show major improvements to water quality as evidenced through decreasing trends in Hexavalent chromium concentrations."

– DOE White Paper on Completion of TPA Target Milestone M-016-110-T01. (November 14, 2012).

A truck hauling a shielded container moves radioactive sludge away from the K-West Reactor. ►

▲ *The 308 Building was one of the largest buildings demolished in the 300 Area.*

Above-grade demolition of the 308 building was completed. The two-story, 71,000 square foot facility was built in 1960 for the development of reactor fuel, including the testing of fuel irradiated to produce plutonium. Fifty two glove boxes — many heavily contaminated with plutonium — were removed from the facility prior to the demolition.

A delegation from Japan visited Hanford to participate in a workshop about nuclear cleanup. Information from across the DOE complex was shared to help with the cleanup efforts at Fukushima.

About 150 people attended an anti-nuclear rally in Richland staged by participants from Occupy Portland.

Hanford's Volpentest HAMMER Training Center celebrated its 15th anniversary. HAMMER has provided safety training for Hanford workers and emergency responders, along with specialized training for other government partners in counterterrorism and border control.

Cesium and strontium capsules being stored underwater at Hanford were rearranged to better distribute the heat they generate. The 1,936 capsules contain about a third of the radioactivity at Hanford. They are stored in a basin inside a building adjacent to Hanford's B Plant. About 800 of the capsules were moved.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and DOE partnered to establish a native plant research center to help restore Hanford land disturbed by plutonium production, the cleanup, and wildfires. The field station included two greenhouses – each of which could grow about 70,000 seedlings, a biology lab-

oratory and an analytical chemistry lab. The field station was built on CTUIR land with about $730,000 of DOE money contributed to the project. Nearly 600 species of native plants grow at Hanford, but revegetation efforts typically involved only eight species. The CTUIR field station was intended to help diversify the species available for Hanford, which could increase the availability of treaty resources and reduce wildfire risk.

The Hanford Natural Resource Trustee Council released a draft Injury Assessment Plan. The plan was intended to help determine injury caused to Hanford's natural resources as a result of the plutonium processing activities at the site. The plan outlined a number of potential studies needed to help better determine injury.

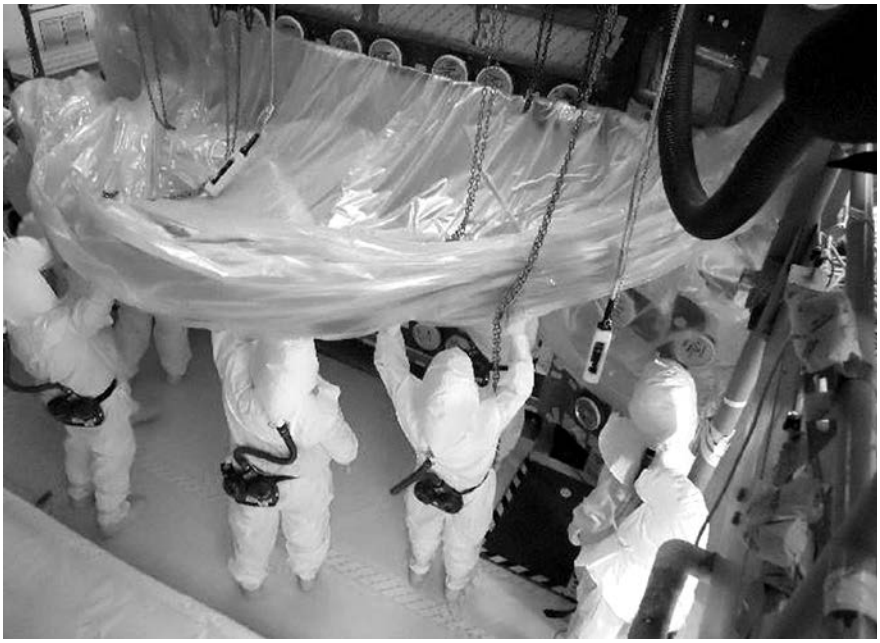
The plutonium vault complex was demolished. Hanford's plutonium was previously stored under heavy guard at the vault complex, part of the Plutonium Finishing Plant. The last of the plutonium was shipped to DOE's Savannah River Site in 2009. The vault complex included six structures covering about 20,000 square feet.

"Each of these plants is found only on one spot on Earth, so the (Endangered Species) Act's powerful protection is crucial to their survival."

– Noah Greenwald, Center for Biological Diversity. (Center for Biological Diversity News Release, May 14, 2012).

The U.S. Fish and Wildlife Service proposed Endangered Species Act protection for two plant species found only in the Hanford Reach National Monument. The agency also proposed designation of just over 3,200 acres in Benton and Franklin counties as protected critical habitat for the two plants. Umtanum desert buckwheat is a woody plant that grows on the McGee Ranch and the White Bluffs bladderpod is a flowering perennial that grows on the White Bluffs. Washington Congressman Doc Hastings criticized the action, saying it could restrict irrigated farming, recreational hiking and vehicle use, and block public access to Hanford Monument land.

DOE released its final Tank Closure and Waste Management Environmental Impact Statement (EIS) — the longest and most expensive EIS ever at Hanford. The document largely reflected preferred



Workers use a plastic sleeve to contain contamination inside a glovebox being removed from the Plutonium Finishing Plant. ►

alternatives listed in the draft EIS released in 2009, including retrieval of at least 99 percent of the tank waste; treating it through the Waste Treatment Plant (WTP) complex; and "landfill" closure of the tank farms — where the emptied tanks would be filled with grout or some other material and left in place. DOE indicated it wanted to examine the possibility of sending waste from certain tanks for disposal as transuranic waste at the Waste Isolation Pilot Plant — a change from the draft EIS. Washington state officials criticized DOE for not choosing a preferred method for treating all of Hanford's tank waste as the WTP will not be able to treat the full volume of tank waste. Ecology said DOE's decision to omit a preferred alternative for supplemental tank waste treatment left the EIS incomplete.

Washington Governor Chris Gregoire joined with four other Western governors in appealing to the Office of Management and Budget (OMB) for support of increased funding for cleanup of the DOE nuclear weapons complex. Governors Butch Otter of Idaho, Brian Sandoval of Nevada, Susana Martinez of New Mexico, and Jerry Brown of California joined Gregoire in asking OMB to "turn around the trend of decreasing budgets" and support full funding for the cleanup.

Jay Inslee was elected Governor of Washington — ending nearly a quarter century of having Gregoire in an official state capacity overseeing Hanford. Gregoire helped negotiate the Tri-Party Agreement as the Director of the Washington Department of Ecology, then helped enforce it during three terms as Attorney General and two more as Governor.

Kevin Smith was named Manager of DOE's Office of River Protection. Smith was most recently manager of DOE's Los Alamos Site Office and also had a long career in the Air Force. He replaced Scott Samuelson, who had managed DOE-ORP for only about 18 months. Samuelson would rejoin DOE's National Nuclear Security Administration.

Steve Hudson, a former college dean in Portland, was elected Chair of the Hanford Advisory Board. He replaced Susan Leckband, who had served as Chair for the past six years and would continue as interim Vice Chair.

DOE agreed to restrict the use of heavy equipment to demolish buildings that still contained asbestos. The agreement followed a U.S. Environmental Protection Agency finding that demolition activities might have threatened worker health. Typically, asbestos had been removed by workers before a building was demolished. In some cases, asbestos panels located high above the ground were mechanically removed, causing regulators to be concerned that the asbestos could become crumbled, pulverized or reduced to powder. Sampling of demolition sites later confirmed that no asbestos was detected above regulatory levels.

National Jewish Health in Denver began an epidemiological study to learn more about chronic beryllium disease and beryllium sensitization at Hanford. The study was the first to examine where affected employees worked and what they did. The intent of the study was to better protect Hanford workers and help guide medical surveillance of current and former workers at risk.

"The single best thing this document does is to clearly indicate the severity of the environmental impacts (both current and future) associated with the waste at the Hanford Site."

– Washington State Department of Ecology Forward to the Final Tank Closure and Waste Management EIS. (November 2012).

"While ($5 billion a year) sounds impressive, in fact it costs the DOE more than three billion dollars a year just to keep the facilities and workers across the vast industrial complex in a safe and operable mode."

– Letter from five Western governors to OMB Deputy Director Jeffrey Zients. (December 20, 2012).

▲ ***DOE-ORP Manager Kevin Smith.***

Tank Waste Treatment

"There are definite perceptions that there is not an environment conducive to raising concerns or where management wants or willingly listens to concerns."

– Independent Oversight Assessment of Nuclear Safety Culture at Hanford's WTP. (January 11, 2012).

The "safety culture" at the WTP continued as a focus throughout much of the year. DOE's Office of Health, Safety and Security conducted an independent assessment of nuclear safety culture and management of nuclear safety concerns at the WTP. It found a "significant number" of staff within DOE's Office of River Protection (ORP) and Bechtel National expressed reluctance to raise safety or quality concerns for various reasons. Fear of retaliation was identified by some Bechtel employees — but not DOE employees — as a factor. The report included recommendations to cultivate a healthy safety culture and to enhance selected safety management processes.

DOE submitted a series of deliverables to the DNFSB as required by their implementation plan to demonstrate progress in addressing the safety culture. The deliverables included the safety culture assessment and ORP's action plan for safety culture improvements. Board Chair Peter Winokur said DOE was making substantial progress in improving the safety culture, but he had yet to see the same commitment from Bechtel.

Bechtel hired a new safety culture manager for the WTP. Ward Sproat previously served as the DOE Director of the Office of Civilian Radioactive Waste Management. During his tenure with that program, DOE submitted a license application for the Yucca Mountain Repository.

Energy Secretary Steven Chu met with Hanford employees in June to discuss the importance of safety. Chu had made a commitment to the DNFSB that he would visit the Tri-Cities and meet with Hanford workers. The visit included a question and answer session with about 500 workers at a Richland park.

"These experts have a reputation for developing creative solutions to highly technical issues and their independent advice will enable us to integrate worthwhile ideas into the design of the plant before construction is completed."

– Energy Secretary Steven Chu. (DOE News Release, August 2, 2012).

Numerous technical questions continued to be asked about the WTP. Secretary Chu assembled a group of independent technical experts to assess the WTP, specifically focusing on the facility's black cells. Black cells are enclosed concrete rooms within the pre-treatment facility that contain tanks and piping. Due to high levels of radioactivity once the plant begins operations, the cells are designed to be sealed

A Hanford tour inside a "black cell." When the plant is completed and operational, the room will be filled with tanks and piping. ►

with no worker access over the anticipated 40-year operating life of the plant. The review was intended to determine whether the plant design would allow for detection and repair of failed equipment inside the black cells. Chu joined the team in closed meetings at Hanford in September. He later announced the formation of five additional technical teams, each focusing on a particular issue.

DOE's engineering division director for the WTP said in a memo to his superiors that Bechtel National should be immediately removed as the design authority for the WTP. Gary Brunson listed 34 instances and technical issues in which Bechtel provided design solutions and technical advice to DOE that he said were determined to be factually incorrect; not technically viable or were technically flawed; or that were not safe for the WTP operators, among other concerns. Bechtel National project director Frank Russo responded that the issues raised in the memo were not new; that many had already been resolved; and that other issues were currently being addressed.

The U.S. Government Accountability Office (GAO) recommended that DOE not resume construction on WTP's pre-treatment and high-level waste facilities until the design for each was much more mature. The GAO said that by "just about any definition," the WTP project had "not been a well-planned, well-managed, or well-executed major capital construction project." It said DOE's decision to use a fast-track, design-build strategy led to many of the current technical problems still being unresolved. GAO was also critical of DOE for prematurely rewarding contractor performance for resolving technical issues later found to be unresolved.

DOE instructed Bechtel to develop new cost and schedule estimates for the WTP. DOE later rescinded that direction and said it would hold off on any new cost or schedule estimates until after the technical issues had been resolved. Testing to resolve waste mixing issues and erosion/corrosion issues were expected to take as long as a few years, and cost many tens of millions of dollars. DOE indicated it would need to enter talks with the State of Washington to negotiate a new timetable.

Washington State officials demanded detailed explanations from DOE about what they were doing to meet existing deadlines. In a letter from Governor Gregoire and Attorney General Rob McKenna to Secretary Chu, the state indicated a willingness to resume legal action if DOE could not demonstrate "good cause" for schedule delays. Gregoire later said she would not leave office in January without either resuming legal action or resolving issues with DOE.

DOE's Inspector General (IG) said DOE procured and installed vessels in the WTP's pre-treatment facility that did not always meet quality assurance requirements. The IG identified multiple instances where quality assurance records were missing or not traceable for processing vessels installed in black cells.

Hanford whistleblower Walt Tamaositis, who said he was removed from the WTP project for raising safety issues, had several setbacks in his legal fight. A Benton County Superior Court judge dismissed his

"There is no question that the Vit Plant project represents a major design and engineering challenge, and I am the first to acknowledge there is still a handful of questions that must be answered before the entire plant can be completed."

– Bechtel National project director Frank Russo. (Bechtel News Release, August 29, 2012).

"Daunting technical challenges that will take significant effort and years to resolve combined with a near tripling of project costs and a decade of schedule delays raise troubling questions as to whether this project can be constructed and operated successfully."

– GAO Report 13-38. (December 19, 2012).

"We're all, frankly, disappointed that this waste stream is so complicated and it's causing us these kind of issues and these kind of problems."

– DOE Senior Advisor Dave Huizenga. (*Tri-City Herald*, June 27, 2012).

"DOE appears to have already decided it will not comply with the Consent Decree based upon the self-imposed limitations of annual funding caps and a judgment that resolution of technical issues…is only possible if the schedule for those facilities is extended."

– Letter from Washington Governor Chris Gregoire and Attorney General Rob McKenna to Energy Secretary Steven Chu. (August 29, 2012).

▲ *A worker in Hanford's Waste Treatment Plant.*

Construction work at Hanford's Waste Treatment Plant. ►

lawsuit against Bechtel National. A federal judge dismissed his lawsuit against DOE and later against URS. The rulings were all appealed.

Bechtel instituted a safety stand-down of work at the WTP construction site, following several minor injuries during the previous month. Employees attended small group meetings to discuss the events and focus on actions to prevent additional incidents.

Bechtel received its lowest award payment for work completed during the first six months of the calendar year. DOE awarded Bechtel just under 50 percent of its possible award payment — an award of $3.1 million out of a possible $6.3 million. Bechtel received "satisfactory" marks for cost and project management. DOE recognized an improvement in safety and health performance and positive steps in nuclear safety and quality culture.

Around the DOE Complex

Workers at the Savannah River Site filled two 1.3 million gallon underground storage tanks with grout. They were the first tanks at the site to be "closed" since 1997, when the Site closed its first two tanks. Savannah River had 47 tanks remaining to be closed.

Three protesters, including an 82-year old nun, penetrated a high-security area at the Y-12 National Security Complex at Oak Ridge, Tennessee. The protesters made their way through four fences and spray painted messages on the walls of a uranium storage building before they were discovered and arrested.

"Additional cost increases amounting to billions of dollars and schedule delays of years are almost certain to occur."

– GAO Report 13-38, which assessed Hanford's Waste Treatment Plant project. (December 19, 2012).

2013

"Right now, the Department of Energy cannot say what changes are needed, when they will be completed, or what they will cost. This is not acceptable for a plant that is, in theory, more than half complete."

– Oregon Senator Ron Wyden, after touring Hanford's Waste Treatment Plant. (*Seattle Times,* February 19, 2013).

The Cleanup

Sequestration and a partial government shutdown had the U.S. Department of Energy (DOE) and its contractors scrambling to determine the impacts, including layoffs, furloughs and future missed cleanup milestones.

Automatic federal spending cuts that went into effect on March 1 reduced Hanford's budget by about $156 million for the seven months remaining in the fiscal year 2013 budget. Up to 4,700 workers were expected to face layoffs or as much as six and a half weeks of forced time off through furloughs.

Layoff notices went to 235 Hanford workers in mid-March, spread among four Hanford contractors. Within a few weeks, the DOE-Richland Office announced it was able to reduce the furlough time for most of its contractor employees to one week after moving about $5 million out of non-cleanup accounts. Workers for DOE-Office of River Protection (ORP) contractor Washington River Protection Solutions initially did not have their furloughs reduced. That was resolved when Congress reprogrammed $48 million — most of which had been previously budgeted to go to Hanford's

◄ *It was a tumultuous year for the Hanford workforce.*

"While these reductions are unfortunate and will be damaging, the Department is doing everything within its power to protect our mission to the greatest extent possible."

– Letter from Energy Assistant Secretary Daniel Poneman to Washington Governor Jay Inslee. (March 5, 2013).

"Now is no time to scale back federal commitments to protecting public and environmental health in our state."

– Washington Governor Jay Inslee. (*Tri-City Herald*, March 18, 2013).

Waste Treatment Plant (WTP). The increased funding also allowed the contractor to hire about 100 workers — just two months after it had laid off 37 workers. The additional funds allowed for increased work to retrieve waste from tanks in the C farm.

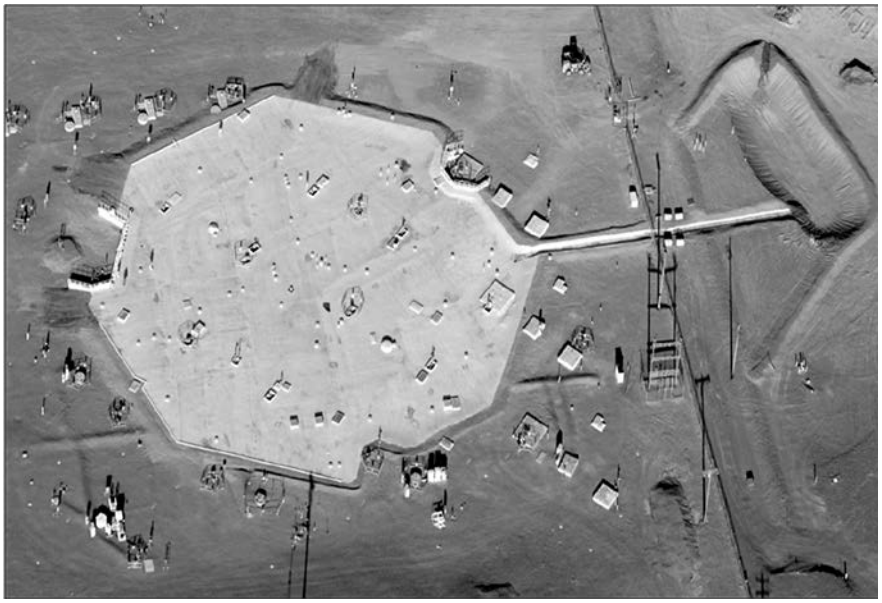
DOE indicated in May that sequestration would likely result in some key Tri-Party Agreement cleanup milestones being missed. The funding cuts delayed the building of an annex needed to move highly radioactive sludge from the K-West Basin, putting in jeopardy a fall 2014 milestone to begin removal of the sludge. DOE indicated that it had also lost all schedule margin for tearing down the Plutonium Finishing Plant, meaning that any additional delays or problems would jeopardize having that facility "slab-on-grade" by 2016.

Additional budget problems occurred October 1 at the start of fiscal year 2014, when a large part of the federal government shut down due to the inability of Congress to approve a budget or a continuing resolution. Most of Hanford's operations were able to continue using money carried over from previous years. The Washington Department of Ecology was also able to operate with carryover funds, but the U.S. Environmental Protection Agency's (EPA) Hanford program was forced to shut down for more than two weeks. DOE was within a few days of issuing thousands of furlough notices when Congress reached an agreement to end the shutdown and fund federal agencies through mid-January.

The year ended with more layoffs due to uncertainty over the budget and possible additional sequestration cuts in 2014.

DOE announced in February that liquid levels in tank T-111, a

Workers in the Plutonium Finishing Plant. ▼



◀ *Much of the T Farm was covered by a temporary surface cap in 2007 to prevent water from infiltrating into the ground.*

single-shell tank, were decreasing. The specific cause of the liquid level decrease was not initially determined, but DOE said nearby monitoring wells did not detect significant changes. DOE estimated the loss of liquids at about 150 to 300 gallons over the course of a year. The 550,000 gallon tank was built in the 1940s and had all pumpable liquids removed in 1995. The tank contained about 447,000 gallons of sludge.

Within a week of the news, Washington Governor Jay Inslee met with Energy Secretary Steven Chu. During that meeting, Chu said five additional single-shell tanks had declining levels of liquids and were likely leaking as well. The cumulative rate of leakage for the six tanks was estimated at less than 1,000 gallons per year. DOE said five of the six tanks contained transuranic rather than high-level waste, and that it would pursue sending that waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico for disposal.

By the end of the year, DOE said further evaluation concluded that evaporation, and not leaks, was the reason that liquid levels were declining in five of the six tanks. T-111 was still considered to be leaking.

A review of DOE's oversight of its tank farm contractor found it to be "effective, well-planned, and timely," but did offer a number of recommendations for improvement.The review was led by a DOE official from Idaho.

Inspections of Hanford's oldest double-shells tank found no evidence of any additional leaks. The inspections began after a leak was detected in October 2012 from the inner shell of tank AY-102, Hanford's oldest double-shell tank. The six tanks that were inspected all went into service in the 1970s. The inspections included AY-101, two tanks in the AZ tank farm, and three tanks in the SY tank farm. Leaked tank waste in the annulus of tank AY-102 continued to change and slowly grow larger. During a visual inspection observed by Ecology

"This news is a sharp reminder, a wakeup call, that we can't be complacent, or waiver in any way, on our nation's commitment to clean up Hanford."

– Washington Governor Jay Inslee, on the announcement that a single-shell tank was actively leaking. (Governor's Office News Release, February 15, 2013).

"It is time to take a solid look at (DOE and its tank farm contractor) to see if we have become complacent or have overlooked advances in monitoring waste tanks."

– Letter from DOE-ORP Manager Kevin Smith to Michael Johnson of Washington River Protection Solutions. (April 19, 2013).

in March, the waste near one riser had become wet and had grown by about 25 percent since a similar examination in December 2012.

DOE notified the State of Washington in June that it would take about 19 months to buy and install equipment necessary to pump the sludge from AY-102. Because of high heat generated in the 150,000 gallons of sludge in the tank, DOE said a minimum 12-15 inch layer of liquid waste needed to remain as a safety measure until the sludge could be pumped. DOE said because there was no evidence of a leak outside of secondary containment, there was no need to initiate pumping of any of the liquid. DOE advocated continued monitoring and pumping only if the conditions worsened.

For a time, it appeared that there was a leak outside of secondary containment. A routine pumping of liquid from the AY-102 leak detection pit unexpectedly found radiation. The pit was intended to collect any leaked waste from a tank, but also routinely collected water from precipitation moving through the soil. There was no unusual reading from the liquid, but radiation was detected on the pump when it was pulled from the pit. After analysis of the liquid and examination of the pump, DOE declared that the liquid was not waste from the tank and that the pump may have been previously contaminated.

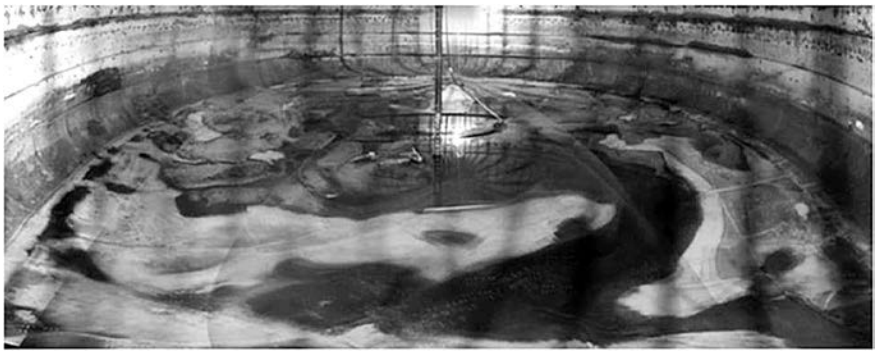
Nevertheless, the Washington Department of Ecology renewed its insistence that DOE remove waste from AY-102, saying that state law required the tank be pumped.

KING Television in Seattle reported that there was evidence of AY-102 leaking nearly a full year before it was announced. They quoted a Hanford worker as saying that he responded to a leak detection alarm at the tank in October 2011 and found high-level waste on equipment pulled from the annulus. He said the contractor reported the alarm to Ecology but attributed it to rainwater that

"We stand solid in our belief that the tank needs to be pumped."

– Jane Hedges, Washington Department of Ecology. (*Tri-City Herald*, September 12, 2013).

Welding during early construction of tank AY-102. ▶



◄ *A composite of photos shows the inside of tank C-110 after waste retrieval.*

most likely leaked into the annulus and said the radioactive readings were probably the result of legacy contamination.

It was another mixed year for tank waste retrievals. The budget sequestration, failed equipment, and an emergency declaration led to only one tank being emptied by the end of the year. Work on tank C-101 progressed well through much of the year then was halted when higher-than-expected radiation readings were found near an equipment box. Work was stopped, workers were evacuated, and an alert was declared. An investigation determined that the source of the radiation was pre-existing contamination on a concrete cover block. Its shielding had somehow been moved. There was no spill and waste retrieval resumed.

Retrieval efforts were successful at tank C-110, which was declared completed in late October — the 11th tank at Hanford to be emptied. Workers used a remotely-operated track-mounted tool to help push waste to pumps in the tank. The "Foldtrack" has a plow-blade, two on-board water jet systems, three high-pressure nozzles and a water cannon that operators can use to break down difficult-to-remove waste. The Foldtrack extended to 12-feet long to fit through a narrow opening into the tank, then folded in half before it was lowered onto the floor of the tank.

The Mobile Arm Retrieval System (MARS) — a robust mechanical arm — continued to work well in tank C-107, but once again was forced to shut down because of a failed pump. Workers also successfully cut a 55-inch diameter hole in the top of tank C-105 to install a MARS arm in that tank.

Four tank farm workers were given medical evaluations after they smelled vapors in the BY and C tank farms. They were cleared to return to work the following day.

The Oregon Hanford Cleanup Board recommended to Governor John Kitzhaber that he advocate for additional tank storage capacity at Hanford. The Board pointed out that the clear degradation of one double-shell tank, the continued technical problems with the WTP, and the continued need to retrieve waste from aging single-shell tanks demanded immediate action to develop additional tank capacity. Governor Inslee agreed, and joined Kitzhaber in saying that additional funds should be provided for new tanks without taking money from existing Hanford cleanup work.

"The (Oregon Hanford Cleanup) board does not make this recommendation lightly – it understands that building additional tank capacity is not a permanent solution for Hanford, it just buys us a bit more time."

– Letter from Oregon Governor John Kitzhaber to Energy Secretary Steven Chu. (January 17, 2013).

▲ *Oregon Senator Ron Wyden at Hanford's B Reactor.*

DOE extended its contract with Washington River Protection Solutions to manage and operate Hanford's tank farms for an additional three years. The extension was valued at about $1.7 billion. DOE also extended its contract with CH2M Hill Plateau Remediation Company for an additional five years and its contract with Mission Support Alliance for an additional three years. The contract extension with CH2M Hill was valued at about $2.1 billion and the extension with Mission Support Alliance was valued at about $950 million.

DOE notified the State of Washington that it would be unable to meet two target milestones related to the retrieval and certification of transuranic waste. DOE said available funds were needed to perform work that ranked higher on their mutually agreed list of priorities.

Hanford had no shortage of VIP's visit the site.

Oregon Senator Ron Wyden toured the site in February — his first visit to Hanford in more than a decade. He said he would use his new chairmanship of the Senate Energy and Natural Resources Committee to ensure that Hanford cleanup issues received a high priority in the Senate. During his tour Wyden pledged support for including Hanford's B Reactor in a Manhattan Project National Historical Park.

Inslee and Attorney General Bob Ferguson toured the Hanford Site in March.

Energy Secretary Ernest Moniz visited Hanford in June. He vowed to have a new plan by the end of the summer to resolve technical issues associated with Hanford's WTP.

"We will put together a plan, going forward, that recognizes today's realities, both technical realities and the uncertainties of budget realities."

– Energy Secretary Ernest Moniz, speaking about the Waste Treatment Plant during his visit at Hanford. (Associated Press, June 19, 2013).

Washington Senator Patty Murray toured the site in August. Her trip focused on B Reactor and old buildings in the towns of White Bluffs and Hanford — all of which could potentially be included in a Manhattan Project National Historical Park.

DOE's Inspector General said WIPP could run out of disposal space before all of Hanford's remote-handled transuranic waste is sent to the repository. The IG said that DOE's focus on shipping "contact-handled" waste meant that some of the remote-handled waste capacity could not be used.

DOE agreed to improve waste handling practices and pay $136,000 in a settlement agreement. EPA investigators conducted an inspection in 2011 and raised concerns that DOE was storing waste in unpermitted areas. DOE said the disagreement was largely a procedural matter caused by approved practices at Hanford that might not be consistent with national permitting practices.

EPA later fined DOE $115,000 for failing to properly control asbestos at demolition sites. EPA said that in some instances workers were not warned of an asbestos dust hazard from waste being disposed at ERDF, and that DOE failed to obtain certain required documentation.

DOE completed 300 Area waste site cleanup and building demolition north of Apple Street, which cuts through the 300 Area. Workers also demolished the 326 Building, a 63,000 square foot building used to experiment with graphite piles that made up reactor cores as well as examined reactor cores and fuel elements.

DOE issued what it called the first in a series of Records of Decision for tank closure and waste management activities at Hanford. The decision included plans for retrieval of 99 percent of the waste in Hanford's underground tanks; landfill closure of the single-shell tank farms; and a continued moratorium on off-site waste until the WTP was operational.

▲ ***DOE Richland Manager Matt McCormick explains Hanford's groundwater treatment program to Washington Senator Patty Murray.***

"When handling mixed (nuclear and hazardous) waste, there's no such thing as being 'too careful.'"

– Ed Kowalski, Director of EPA's Regional Office of Compliance and Enforcement. (EPA News Release, July 1, 2013).

◀ ***Demolition of the 326 Building.***

The K-East Reactor. ►

"Visually, the (K-East) reactor is almost unrecognizable from when we started, and you can see that cleanup is taking place."

– Carroll Phillips, CH2M Hill Plateau Remediation Company. (*Tri-City Herald,* February 14, 2013).

Work to cocoon the K East Reactor was suspended and the reactor was put in "interim surveillance" until funds become available to complete the work. More than 50 openings were covered and all combustible and hazardous materials were removed.

Two huge excavations were dug near D Reactor to remove Hexavalent chromium from the soil. Just as they did near C Reactor, workers dug 85 feet deep and removed tons of soil — much of it stained green and yellow with chromium.

Hanford workers exceeded DOE's annual goal to remove at least 500 pounds of Hexavalent chromium from groundwater near the Columbia River. The groundwater treatment program also surpassed

Deep excavation for chromium in the D Area. ►

DOE's goal to treat 1.4 billion gallons of groundwater by the end of the fiscal year.

Disposal of waste into the Environmental Restoration Disposal Facility reached the 15 million ton mark since the facility began operations in 1996.

Officials from the Tokyo Electric Power Company toured Hanford to observe how radioactive contamination was cleaned up. The Japanese delegation was interested in seeing how expertise developed at Hanford could be applied at Fukushima.

Two plant species found only in the Hanford Reach National Monument gained protection under the Endangered Species Act. The U.S. Fish and Wildlife Service also designated 3,200 acres in Benton and Franklin counties as protected critical habitat for the two plants, the Umtanum desert buckwheat and the White Bluffs bladderpod.

Two bald eagles were born on the Hanford Site. It was believed to be the first instance of this occurring since the site was established in 1943.

A bust was dedicated in Richland of Colonel Franklin Matthias, the man who chose the area for plutonium production and directed Hanford's World War II construction. The bust was located in front of the Richland City Library.

"Just a small amount of Hexavalent chromium with a weight equivalent to one grain of salt could contaminate eight gallons of water above aquatic standards."

– Bob Popielarczyk, CH2M Hill Vice President of groundwater remediation. (DOE/CH2M Hill News Release, May 13, 2013).

Tank Waste Treatment

When the WTP might become operational became more and more uncertain as the year progressed.

In January, Energy Secretary Chu notified outgoing Washington Governor Chris Gregoire that his technical review teams had identified opportunities to maintain some progress in moving forward with tank waste treatment, while also acknowledging that lengthy testing was necessary to resolve some of the outstanding technical issues. Chu said that DOE was seriously evaluating whether they would be able to operate the low-activity waste (LAW) and high-level waste (HLW) vitrification facilities independent of the pre-treatment facility. He said that could provide an opportunity both to begin treatment of some of Hanford's tank waste and provide redundancies in the tank waste treatment system. Chu indicated that DOE would begin full-scale testing to better address the waste mixing issue. He also listed a number of other technical issues that still had to be resolved as well. He said limited construction work on the HLW facility could resume, but work on the pre-treatment facility would remain on hold.

In March, DOE announced a preferred alternative to send up to 3.1 million gallons of Hanford tank waste, contained in up to 20 tanks, to WIPP for disposal. The State of New Mexico had changed

"The review has identified opportunities to increase the flexibility and reliability of the Hanford tank waste treatment system."

– Letter from Energy Secretary Steven Chu to Washington Governor Chris Gregoire. (January 14, 2013).

Construction work on the pre-treatment facility would remain on hold while technical issues were resolved. ►

"With regard to Hanford waste, I urge all parties involved to exhibit caution and scientific integrity to ensure that DOE is abiding by the law and that the waste classifications are justified."

– New Mexico Senator Tom Udall. (Associated Press, March 6, 2013).

"The waste proposed for treatment and transfer to WIPP is too small a fraction of the total inventory of Hanford tank waste to make the investment worthwhile."

– Letter from three public interest groups to Energy Secretary Steven Chu. (March 26, 2013).

"Viewed as a whole, this Framework describes an approach that would allow for immobilization of tank waste to begin as early as practicable without waiting for the completion of work to resolve the technical issues associated with the Pre-treatment and HLW facilities."

– Hanford Tank Waste Retrieval, Treatment, and Disposition Framework. (September 24, 2013).

"We're not coming to (DOE) with an idea. We're coming with a proven technology."

– Dave Brockman, Deputy Chief Operating Office for Kurion. (*Tri-City Herald*, March 20, 2013).

the WIPP permit in 2004 to specifically prohibit tank waste from Hanford, the Savannah River Site and the Idaho National Laboratory from being disposed at WIPP. In April, DOE proposed a permit modification to allow Hanford tank waste into WIPP that did not meet the legal definition of high-level waste. The State of New Mexico said the public would have opportunities to weigh in on the permit modification request. Governor Inslee endorsed the plan to send some Hanford tank waste to WIPP for disposal, saying it was the fastest way to get waste out of Hanford's aging tanks.

In September, DOE released a "framework" that more formally proposed some of what Chu had mentioned in January. The framework broadly proposed three elements: begin immobilization of some tank waste through direct feed of waste to the LAW facility; retrieve and process waste in up to 11 single-shell tanks for disposal as transuranic waste at WIPP; and continue to resolve the outstanding technical issues. The framework offered few details of new facilities or modifications that would be necessary to begin to process some of the waste. Washington and others requested additional information to better evaluate the proposal.

DOE notified the states of Washington and Oregon in June and again in October that various milestones related to WTP construction and tank waste retrieval were at risk. October's announcement in effect meant that all remaining milestones through 2022 were at risk. The State of Washington responded that they were disappointed, but not surprised. They did not indicate what action they might take to address the missed deadlines.

Kurion proposed a modular vitrification system to treat some of Hanford's low-activity tank waste. The company, which opened a test laboratory in Richland in 2012, said it could potentially begin treating some waste by late 2014.

DOE's Office of Safety, Security and Quality Assurance notified the Defense Nuclear Facilities Safety Board that DOE and Bechtel continued to make progress in addressing safety culture at the WTP. Deputy Assistant Secretary Matthew Moury wrote that ORP had made a "substantial start" toward improving its safety culture, but that much re-

mained to be done to demonstrate effective change.

Critics said little had changed when whistleblower Walter Tamosaitis was laid off from his job in October. Oregon Senator Ron Wyden wrote to Energy Secretary Moniz, saying the action "perpetuates a culture" where employees are afraid to raise legitimate concerns.

Whistleblower Donna Busche filed a second legal complaint with the Department of Labor, saying that she continued to suffer retaliation and harassment since she filed her initial whistleblower complaint in 2011.

Bechtel said it made "substantial" construction progress at the WTP during the year, including the placement of structural steel to the 37-foot level at the HLW facility; completing construction of the steam plant; and completing a considerable amount of work at the Analytical Laboratory.

Around the DOE Complex

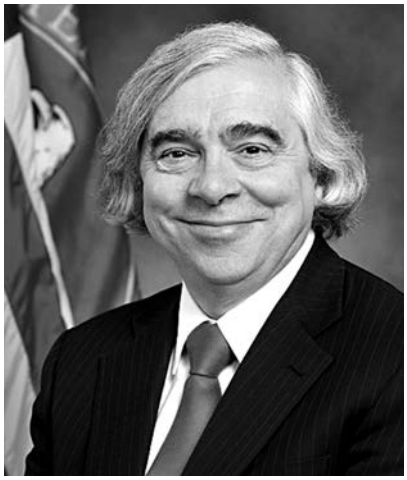
DOE released a strategy for management and disposal of spent nuclear fuel and high-level waste. The strategy built on many of the recommendations of the Blue Ribbon Commission on America's Nuclear Future. It endorsed a waste management system that contained a pilot interim storage facility; a larger, full-scale interim storage facility; and a geologic repository. All of the facilities would be sited through a consent-based approach. It indicated a pilot interim storage facility could operate by 2021 and a repository could operate by 2048. DOE said it would need Congress to pass legislation to allow most of the strategy to be implemented.

A group of four Senate leaders, including Senator Wyden, released a discussion draft of legislation to enact many of the changes. It called for establishment of a new federal agency for nuclear waste administration and required local and state consent for siting storage

◄ *Air handling equipment in the Analytical Laboratory.*

"Is DOE's status quo (with the Waste Treatment Plant) at Hanford acceptable to you?"

– Question from Oregon Senator Ron Wyden to Energy Secretary nominee Ernest Moniz. "No, it is not." Moniz' response. (April 9, 2013).



Energy Secretary Ernest Moniz

or disposal facilities.

The U.S. Court of Appeals ordered the U.S. Nuclear Regulatory Commission to resume review of the Yucca Mountain license application. The Court ruled that the Obama Administration and DOE were wrong to terminate the Yucca Mountain program since Congress had designated the site in 2002 for a nuclear waste repository. The decision did not obligate Congress to appropriate additional funds for the process.

Chu announced his resignation as Energy Secretary in February. In a wide-ranging memo to DOE employees, Chu expressed optimism that the technical issues at Hanford's WTP would be resolved.

President Obama nominated physicist Ernest Moniz to replace Chu. A former DOE Under Secretary, Moniz was a professor at Massachusetts Institute of Technology and a former member of the Blue Ribbon Commission. During a confirmation hearing before the Senate Energy and Natural Resources Committee, Hanford was the focus of a number of questions from Committee Chair Senator Wyden and Washington Senator Maria Cantwell. Moniz committed to visiting Hanford sometime early on in his tenure. He also said he would meet with Hanford whistleblowers. Moniz was unanimously confirmed by the full Senate in May.

"For its decades of litigation and lack of progress, this same administration has proposed about 20 percent more financial support for the Hanford Site in Washington State…the true effect of this policy is to punish success and fund failure."

– Letter from South Carolina Governor Nikki Haley to Energy Secretary Ernest Moniz, complaining about funding increases at Hanford when funding for the Savannah River Site was cut. (September 6, 2013).

2014

"Your proposal, as we understand it, is to monitor the leaking Tank AY-102 and take no action to remove its waste until conditions get worse. This is unacceptable."

– Letter from Jane Hedges of the Washington Department of Ecology to DOE-ORP Manager Kevin Smith and Washington River Protection Solutions President Dave Olson. (January 9, 2014).

The Cleanup

The State of Washington and the U.S. Department of Energy (DOE) strongly disagreed over the necessity to pump waste from tank AY-102, a double-shell tank that was determined to be leaking from its inner shell in October 2012. As the year began, the Washington Department of Ecology told DOE that it must immediately establish a plan for pumping waste from the tank. Ecology argued that DOE did not know the location of the leak; the rate of leakage; the conditions at the leak site; what effect changes in temperature would have on the leak; or when or how the leak might worsen.

Because of heat generated within the 151,000 gallons of sludge in the waste, DOE said that a layer of liquid was necessary to moderate the temperature of the waste, and that no waste should be pumped until DOE could also remove the sludge.

DOE released a new pumping plan in March. That plan indicated

◄ *Construction of tanks AY-101 and AY-102.*

"Waiting another two years, at best, to initiate actions to address this hazardous condition is neither legally acceptable nor environmentally prudent."

– Washington Ecology Director Maia Bellon. (Ecology News Release, March 21, 2014).

"The Department believes there are risks associated with pumping tank AY-102 at this time. The tank is not leaking into the environment, and there is no immediate threat to the public or the environment posed by AY-102."

– DOE statement. (March 21, 2014).

DOE would begin buying equipment and making preparations, but that actual pumping of the waste could not begin prior to March 2016. DOE again said that liquids should not be pumped until the sludge could also be removed, unless conditions significantly worsened. The following day, DOE announced that a third area of leaked waste was discovered in the annulus of the tank — the space between the two tank walls. That area had been clear when last examined in September 2012. The new area of dried waste was estimated to cover an area about seven feet by 21 inches.

By late March, the State of Washington issued an Administrative Order, directing DOE to begin removing liquid waste from the tank by September 1, 2014. DOE was also directed to begin removal of sludge by December 1, 2015, and complete sufficient removal of waste to determine the cause of the leak by December 1, 2016. DOE filed an appeal of the Administrative Order with the State Pollution Control Board, arguing that the state requirements conflicted with the safe handling of nuclear materials, which came under the authority of DOE.

The condition of Hanford's other double-shell tanks was also a subject of great scrutiny. DOE reviewed construction records for all of Hanford's 28 double-shell tanks. Those records were interpreted in different ways. DOE said that while the reviews indicated construction difficulties with many of the tanks, none were as severe as the problems with AY-102. In addition, no other double-shell tank had the same combination of high-heat waste and waste without a corrosion inhibitor. DOE did indicate it would conduct more frequent visual inspections of all the tanks. DOE's review of the last eight double-shell tanks built at Hanford found only minor construction issues.

Oregon Senator Ron Wyden wrote a letter to Energy Secretary Ernest Moniz, saying that the construction reviews contradicted

"All (double-shell) tanks had some levels of construction challenges, but all were accepted or repaired and put into service."

– Tom Fletcher, DOE Assistant Manager for the tank farms. (*Tri-City Herald,* February 28, 2014).

A welder works on the exterior shell of tank AY-102. ►

◀ *Workers in a Hanford tank farm.*

DOE's statements that problems with AY-102 were isolated. Wyden said the reviews demonstrated that as many as 19 additional double-shell tanks either had similar problems to AY-102 or might be compromised. He also criticized DOE for withholding the construction reviews from policymakers and Northwest residents.

Tank vapors sickened 26 Hanford workers from mid-March through early April. A few workers were taken to Kadlec Medical Center and were treated and released. Others received treatment and evaluation at Hanford's on-site medical facility. The problems occurred at several of Hanford's tank farms. Some potential sources were discovered, such as a cut in the insulation at a pump pit in the A Tank farm, and liquid in old equipment staged for disposal in the S Tank farm.

Hanford's tanks contain at least 1,200 different chemicals. The tanks vent through filters to the atmosphere, but tank vapors have been a periodic problem at the site for decades. Washington River Protection Solutions required respirators to be worn in the A complex of tank farms, though other workers were encouraged to wear respirators if they chose to do so. Workers for Mission Support Alliance called a "stop work" order after complaining that non-tank farm workers were not receiving sufficient information about potential hazards. Additional monitoring was conducted within many of the tank farms. In late April, Washington River Protection Solutions announced that Savannah River National Laboratory would establish an expert panel to assess the vapor management program and related worker protection measures.

DOE asked Ecology if waste retrieval efforts in two Hanford single-shell tanks were sufficient to call it good. Two different technologies were used to remove waste from tank C-101, and DOE asked Ecology to waive the requirement to use a third technology on the remaining 5,000 gallons of waste in the tank. DOE said there was no remaining technology it could use to substantially reduce the risk from

"I have now learned that subsequent construction reviews of other DSTs indicate that at least six other tanks have construction flaws similar to those that are attributed to the AY-102 leak, and 13 additional DSTs may also be compromised."

– Letter from Oregon Senator Ron Wyden to Energy Secretary Ernest Moniz. (February 28, 2014).

"While a number of steps have been taken and improvement made in recent years to address chemical vapor hazards, the latest set of exposures shows that more work needs to be done."

– Washington River Protection Solutions President Dave Olson, in a message to workers. (April 28, 2014).

the waste in the tank. DOE also asked Ecology to declare retrieval activities in tank C-112 as complete, despite about 13,000 gallons of waste remaining in that tank. Efforts to remove that waste, which was in a hard layer on the bottom of the tank, had been unsuccessful and DOE said it did not have an available technology to break up the waste. Retrieval activities continued in tank C-107.

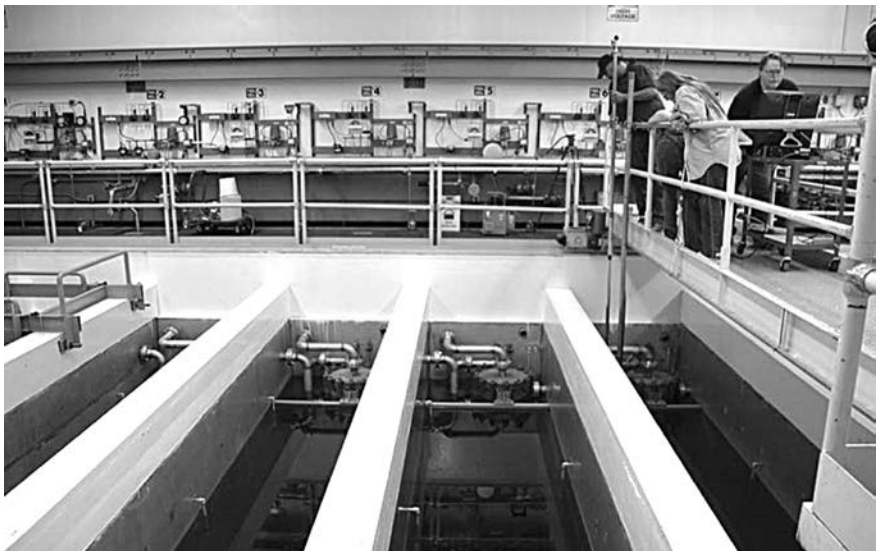
Ecology and DOE reached a settlement agreement related to waste management practices. DOE agreed to a stipulated penalty of $261,000 and not to appeal the "Agreed Order." DOE paid $15,000 and the remainder was suspended pending completion of corrective actions. By early May, half of the penalty had been waived as DOE provided sufficient documentation to demonstrate improvement. Ecology had identified violations of state Dangerous Waste Regulations at the Waste Receiving and Processing Facility in 2011 after a drum leaked radioactive and chemical waste onto the floor. Additional violations were discovered at the Central Waste Complex in 2012, when radioactive and hazardous chemical contamination was found dripping from a waste box. Among the changes required by DOE was for it to provide more immediate notification to Ecology when there were spills or other incidents. The Order also covered waste management practices at Hanford's T Plant.

The U.S. Environmental Protection Agency (EPA) reached settlement with two Hanford contractors to resolve alleged violations of federal asbestos handling regulations. The settlements came from what EPA determined was improper demolition work dating back to 2007. Washington Closure Hanford was fined $131,594 and CH2M Hill Plateau Remediation Company was fined $44,000. The penalties were related to clean air regulations. Fines were previously assessed that were related to environmental cleanup regulations.

DOE's Inspector General (IG) recommended that DOE move "expeditiously" to move 1,936 cesium and strontium capsules from pool storage to dry storage. The IG noted that the concrete basin in which

"EPA requires all building owners and contractors to remove asbestos before starting any regulated demolition activity which can crush or pulverize asbestos and release dust."

–Ed Kowalski, Director of EPA's Enforcement Office in Seattle. (EPA News Release, April 2, 2014).



Cesium and strontium capsules are stored under water in the Waste Encapsulation Storage Facility. ►

◄ *A 1,153 ton concrete vault makes its slow journey to the Environmental Restoration and Disposal Facility.*

the capsules are stored had exceeded its design life and likely suffered deterioration from radiation exposure, making the facility vulnerable to an earthquake. The issue had previously been raised to DOE by the Defense Nuclear Facilities Safety Board and the State of Oregon. The capsules contain about a third of the total radioactivity on site.

In January, Congress approved $2.2 billion in funding for Hanford for fiscal year 2014. It was an increase of about $186 million over the previous year's funding, and negated the need for nearly 300 layoffs that had otherwise been anticipated because of budget uncertainties. The President's proposed budget for fiscal year 2015 would cut the Richland Office funding by about $98 million.

DOE announced it was shutting down the Waste Sampling and Characterization Facility within the next year, saying that offsite laboratories could provide the analytical services at significantly lower cost. The laboratory opened in 1994 to analyze environmental and cleanup samples, at which time DOE and its regulators believed that commercial laboratories could not support the volume of work or turnaround times required for analyzing Hanford samples. DOE said that capacity and turnaround time of offsite laboratories had greatly improved. About 80 people worked at the laboratory.

Hanford workers successfully moved two large waste packages from the 300 Area to the Environmental Restoration Disposal Facility (ERDF). The first was the Plutonium Recycle Test Reactor — the largest of Hanford's experimental reactors. It weighed 1,082 tons. A few weeks later, a concrete vault that held two waste storage tanks was also shipped to ERDF. The vault weighed 1,153 tons.

A record number of bald eagles were observed on the Hanford site during the winter. Hanford scientists spotted 60 eagles during boat trips on the Columbia River. As few as two or three eagles per year were observed in the 1950s. That number had grown steadily through the years. A record fall Chinook salmon run was thought to be the primary reason for the large number of eagles.

Washington Congressman Doc Hastings — whose district includ-

"Weakened concrete in the walls of the pool increases the risk that a beyond design earthquake would breach the walls, resulting in loss of fluid, and thus, loss of shielding for the capsules."

– DOE IG Report OAS-L-14-04. (March 26, 2014).

ed the Hanford Site — announced he would not run for re-election in 2014. A ten-term Congressman, Hastings created the House Nuclear Cleanup Caucus to help bring Congressional focus and funding to DOE nuclear weapon production sites throughout the nation.

DOE Richland Manager Matt McCormick announced his retirement, effective in mid-June. McCormick had served as Manager since mid-2010.

Tank Waste Treatment

DOE and the State of Washington were unable to reach agreement on new schedules for the Waste Treatment Plant (WTP) and retrieval of waste from the single-shell tanks. After notifying the states of Washington and Oregon that milestones in a 2010 Consent Decree were at risk, DOE released a "framework" in September 2013 that broadly proposed three elements for moving forward with tank waste treatment: begin immobilization of some tank waste through direct feed of waste to the low-activity waste (LAW) vitrification facility; retrieve and process waste for disposal as transuranic waste; and continue to resolve outstanding technical issues associated with the WTP.

Concrete is poured at the Waste Treatment Plant's high-level waste vitrification facility. ▼

◀ *Washington Governor Jay Inslee and Energy Secretary Ernest Moniz discuss Hanford's Waste Treatment Plant.*

The State of Washington said the proposal lacked sufficient details to evaluate whether it had merit, and repeatedly asked for additional details.

DOE indicated it would have a proposal ready for the state by the end of February. Washington Governor Jay Inslee and Attorney General Robert Ferguson laid out their expectations for DOE's proposal in a letter. The letter indicated that the proposal must contain "the specificity, detail and comprehensiveness" which DOE had yet to provide.

Secretary Moniz indicated that he wanted to personally present a plan to Washington State leaders. That meeting occurred in mid-March. Following that meeting, Governor Inslee said that while there were some aspects of DOE's plan that had merit, DOE still did not provide the "comprehensiveness and level of detail" that the State had requested.

Two weeks later, both Washington and DOE submitted proposals to revise the 2010 Consent Decree. Washington's detailed proposal included 124 new milestones. DOE's proposal contained few specific deadlines, but outlined a process for setting new deadlines once technical issues with the pre-treatment and high-level waste vitrification facilities had been resolved. DOE's plan required some additional facilities — one for pre-treating the low-level waste and another for mixing, sampling and feeding the high-level waste.

Washington agreed to the concept of beginning some waste treatment before the entire WTP complex was completed. The State proposed the start of LAW vitrification beginning at the end of 2019. It proposed numerous new milestones for construction and start of operations for the remainder of the WTP, but maintained the date for completion of waste treatment by 2047. The State also offered a new schedule for single-shell tank waste retrieval, but again maintained the date for completion of retrievals by 2040. The State proposed adding new double-shell tank capacity, starting with a minimum of eight million gallons of new complaint storage capacity by 2024, with the

"An acceptable path forward must also be aggressive but realistic. It must be a path that gives the State confidence that tank waste retrieval and treatment will be completed as soon as possible."

– Letter from Washington Governor Jay Inslee and Washington Attorney General Robert Ferguson to Energy Secretary Ernest Moniz and U.S. Attorney General Eric Holder. (February 11, 2014).

"The proposal embodies a hybrid approach by providing a set of near-term, fixed deadlines, along with a commitment by DOE to propose and establish future milestones within specified time periods once sufficient information is available on which to base those milestones."

– Summary of DOE's Proposal to Amend the Consent Decree. (March 31, 2014).

Workers inside the Waste Treatment Plant's low-activity waste vitrification facility. ►

"Our proposed amendments to the consent decree address (the need for a detailed and comprehensive path forward) by providing very specific steps for meeting these deadlines to ensure Hanford cleanup is completed in a timely manner.

– Washington Governor Jay Inslee. (Washington Governor's Office News Release, March 31, 2014).

"We will set future milestones when the time is right. We do not want to set them prematurely and create false expectations in the community and with the state."

– DOE Senior Advisor Dave Huizenga. (*Tri-City Herald,* April 14, 2014).

potential of up to 12 million more gallons of tank capacity by 2034, if various waste retrieval goals were not met. The State also proposed removing additional liquids from 24 single-shell tanks; constructing interim surface barriers over seven tank farms plus tank T-111; and new accountability terms, including regular progress reports, added to a Consent Decree to ensure DOE remained on track.

DOE proposed moving forward with direct-feed LAW, but said it would take until 2022 to be operational, three years later than the state's proposal. DOE did say it would meet a current Consent Decree milestone for having tank waste retrievals completed in 19 single-shell tanks by the end of 2022. It did not propose any new double-shell tanks.

By mid-April, both parties had rejected the respective proposals. On April 23, the State of Washington triggered dispute resolution. Negotiations between the parties began.

DOE began to provide some details on proposed new facilities required to support plans to bypass the pre-treatment facility and begin vitrification of some of Hanford's tank waste. At Hanford Advisory Board committee meetings in February and March, DOE discussed the need for an underground, interim pre-treatment facility to allow some liquid waste to go to the LAW vitrification facility. DOE also provided some details on a facility to "precondition" waste that might cause problems in the pre-treatment facility, such as waste with large or dense particles.

DOE said it planned to simplify the design of waste tanks needed in the WTP's pre-treatment facility. DOE said that would reduce the time needed for testing by three to five years and save up to $180 million. Eight tanks with five different designs would be replaced with up to 16 smaller tanks with a uniform design.

Whistleblower Donna Busche was fired from her job in February, again provoking criticism of DOE and its contractors for how they

had handled WTP technical and safety issues raised by Busche and others. Senator Wyden said he would ask the Government Accountability Office to investigate what he referred to as a pattern of contractor retaliation at Hanford, as well as DOE's lack of response. DOE asked the Office of Inspector General to investigate the firing. Senator Claire McCaskill of Missouri hosted a roundtable discussion with Wyden and Hanford whistleblowers, and led a formal Senate subcommittee hearing on whistleblower retaliation. Bechtel and URS Corp representatives strongly denied any retaliation had occurred.

A Construction Project Review of the WTP estimated that at least $430 million in additional funding would be required for those parts of the complex where construction was progressing. It did not estimate increased costs necessary to resolve technical issues or to build new facilities to support direct-feed LAW. The additional cost would raise the total project cost from $12.263 billion to $12.693 billion.

Around the DOE Complex

The Waste Isolation Pilot Plant (WIPP) in New Mexico was shut down — first because of an underground fire involving a salt-hauling vehicle, and ten days later because of a release of radioactive material to the environment. The events appeared to be unrelated. Thirteen WIPP employees who were at the site on the evening of the release tested positive for small amounts of radiological contamination. While the investigation into the release was underway, DOE made arrangements

◄ *A damaged drum inside the Waste Isolation Pilot Plant.*

"Rather than fix the problems at Hanford, the contractors and federal agencies involved are simply trying to silence the people who raise concerns."

– Oregon Senator Ron Wyden. (Senator Wyden News Release, March 11, 2014).

"The job that whistleblowers do is tremendously important and valuable. That's why, when courageous men and women feel compelled to speak out, we do not want to silence them."

– Missouri Senator Clair McCaskill. (Senator McCaskill News Release, March 11, 2014).

to temporarily store some Los Alamos waste at a commercial radioactive waste disposal site in West Texas, about 50 miles from WIPP. DOE was required to remove the waste from Los Alamos by June 30, to meet a commitment to the state. After some waste had been taken to the Texas site, DOE determined that the radioactive release was the apparent result of a chemical reaction inside a barrel of waste that came from Los Alamos. All transuranic waste shipments were then halted. DOE expected that WIPP could be shut down as long as three years.

A DOE review determined that continuing construction of a plant at the Savannah River Site to turn surplus Cold War plutonium into nuclear fuel was "not viable" within current funding levels. DOE had already spent $4 billion on the plant, which had originally been estimated to cost $1 billion. To complete and operate the plant was estimated to cost $25 to $34 billion more. DOE said it remained committed to the overarching goal of destroying the plutonium and meeting its treaty commitments to Russia.

DOE announced that Dave Huizenga, who had served for two and a half years as the head of DOE's environmental cleanup project — though he was never confirmed by Congress in that role — would be leaving the position. Monica Regalbuto was nominated to be the Assistant Secretary for Environmental Management.

An 84-year old nun, who penetrated a high-security area at the Y-12 National Security Complex at Oak Ridge, Tennessee in 2012 along with two others, was sentenced to 35 months in prison. The protesters made their way through four fences and spray painted messages on the walls of a uranium storage building before they were discovered and arrested.

DOE celebrated closure of the $6 billion American Recovery and Reinvestment Act Program. DOE said its Recovery Act successes included the creation of more than 11,000 technical jobs; more than $7.2 billion in life-cycle cost savings; and completion of 135 projects or activities.

"We have really serious challenges in making progress at these nuclear cleanup sites across the country. And I would like you and the Department of Energy to work with me to develop a long-term comprehensive plan to make sure that we are meeting the needs of these really incredibly important sites."

– Washington Senator Patty Murray to Office of Management and Budget Director Sylvia Mathews Burwell at a Senate Budget Committee hearing. (March 5, 2014).

Notable Events/Accomplishments

1989

May	The Tri-Party Agreement is signed. Cleanup formally begins (page 1).
August	Energy Secretary James Watkins says Hanford will become the "flagship" for waste management research (page 6).
October	The U.S. Environmental Protection Agency (EPA) adds four Hanford areas to its Superfund National Priorities List (page 1).
	Washington Governor Booth Gardner appoints a special team to conduct an in-depth investigation of the explosive risk posed by ferrocyanide in some of Hanford's tanks (page 5).
November	The U.S. Department of Energy (DOE) awards a $550 million construction contract to begin building a high-level waste vitrification plant (page 2).
December	PUREX resumes limited operations for a "cleanout" run (page 3).
	Energy Secretary Watkins agrees to declassify all Hanford documents from 1944-1960 which describe radioactive releases to the environment (page 4).

1990

January	Washington State officials conclude that ferrocyanide in some of Hanford's tanks does not pose a serious risk of explosion (pages 10-11).
March	A new potential safety risk is identified in Hanford's tanks — the buildup of hydrogen (page 11).
May	A "Tiger Team" of investigators arrives at Hanford to examine its operations, including its environmental, safety and management practices (pages 8-9).
September	DOE informs Washington State officials that tank safety issues might delay the construction and operation of the vitrification plant (page 10).
October	Energy Secretary Watkins announces that PUREX will not reopen for further production of plutonium (page 8).

1991

January	Energy Secretary Watkins announces delays of two years or more for Hanford's vitrification and pre-treatment plants (page 15).
	A "Watch List" for Hanford's tanks is created through legislation introduced by Oregon Congressman Ron Wyden (pages 18-19).
February	The first Superfund cleanup work begins at Hanford (page 16).
April	DOE estimates 444 billion gallons of contaminated liquids were disposed to the soil during Hanford's operating years (pages 16-17).
May	The first major revisions to the Tri-Party Agreement are made. They relate to the start of construction and operation of the vitrification plant and delays in pumping liquids from the single-shell tanks (page 15).
July	Westinghouse Hanford announces a successful demonstration to extract carbon tetrachloride from the soil (page 17).
August	Energy Secretary Watkins announces the permanent closure of N Reactor (pages 17-18).
December	DOE agrees to drop consideration of B Plant for pre-treatment of Hanford's tank waste (page 16).

Notable Events/Accomplishments

1992

January	DOE releases a report detailing 127 significant accidents at Hanford (page 21).
April	A Hanford worker dies from a fall at F Reactor (page 22).
	The Hanford Future Site Uses Working group conducts its first meeting (page 23).
May	Groundbreaking ceremonies are conducted to mark the beginning of construction of the vitrification plant (page 21).
June	Two Battelle scientists are killed in a plane crash (page 22).
	B Reactor is listed on the National Register of Historic Places (page 22).
September	A large venting of hydrogen occurs in tank SY-101 (page 25).
October	President Bush signs the Federal Facilities Compliance Act (pages 25-26).
	Tank T-101 is declared Hanford's 67th known or suspected leaking tank (page 23).
December	Energy Secretary Watkins announces the permanent closure of PUREX (page 22).

1993

May	The Hanford Tank Waste Task Force meets for the first time (pages 30-31).
June	A Hanford worker dies from steam burns (page 28).
July	A large mixing pump is installed in tank SY-101 (page 32).
August	A Hanford worker lowers a rock on a rope into a high-level waste storage tank (page 29).
September	During a two-day "Hanford Summit," Energy Secretary Hazel O'Leary pledges to streamline the Hanford cleanup and vows to declassify a large number of DOE documents (page 29).
October	The Tri-Parties agree to major changes in the Tri-Party Agreement related to the vitrification plant, overall cleanup deadlines and escalated actions to treat groundwater (page 31).
November	DOE announces its final plan for disposal of eight plutonium production reactors (pages 27-28).
December	Energy Secretary O'Leary releases previously classified documents related to radiation experiments on people, unannounced nuclear tests, and the nation's plutonium stockpile (page 34).

1994

January	The Hanford Advisory Board conducts its first meeting (page 35).
April	Groundbreaking ceremonies are held for the Waste Receiving and Packaging facility (page 36).
May	Ten Hanford tanks are added to the Wyden Watch List because of concerns about organics (page 39).
	DOE begins shipment of 309 cesium capsules back to Hanford from a commercial irradiation facility in Colorado (page 36).
	The Defense Nuclear Facilities Safety Board says there is an urgent need for DOE to treat and stabilize plutonium-bearing materials and spent fuel at Hanford and other DOE sites (page 36).
June	Hanford Summit II is conducted in Pasco (pages 36-37).
July	Bechtel takes over as the site's primary environmental restoration contractor (page 36).
October	Changes in the Tri-Party Agreement are approved which shifts the environmental management program's top priority to cleanup along the Columbia River (page 37).
November	The Spokesman Review publishes a series of articles on the "river of public money" that flows to Hanford (page 38).

1995

February	The Hanford Advisory Board recommends DOE not accept waste for disposal at Hanford unless 11 criteria are met (page 43).
March	The "Blush Report" is published (pages 41-42).
April	DOE estimates Hanford cleanup will cost $48.7 billion over the next 75 years (page 46).
May	A consultant hired by the Hanford Advisory Board concludes new double-shell tanks are not needed (page 46).
June	The 33 worst liquid waste streams at Hanford are all stopped, treated, or re-routed from hazardous waste disposal areas (page 43).
July	A groundbreaking ceremony is held for the HAMMER training facility (page 44).
September	Energy Secretary O'Leary announces DOE will pursue privatization of its tank waste treatment program (pages 45-46).

1996

February	DOE finds cesium contamination in dry wells 125 feet below the surface (page 49).
June	DOE completes removal of all plutonium from PUREX (page 51).
	DOE removes four tanks from the Wyden Watch List and closes out ferrocyanide as a tank safety issue (page 53).
July	The Environmental Restoration Disposal Facility is dedicated (page 51).
August	EPA says the 1100 area is cleaned up and should be removed from its Superfund list (page 52).
	DOE issues its final Tank Waste Remediation System Environmental Impact Statement (page 53).
September	DOE awards bids to two companies for the tank waste vitrification privatization project (page 53).
October	Fluor Daniel Hanford Company takes over as prime Hanford contractor from Westinghouse (pages 51-52).

1997

March	Hanford's Waste Receiving and Processing facility begins limited operations (pages 55-56).
May	A chemical storage tank explodes in the Plutonium Reclamation Facility (pages 57-58).
June	PUREX is deactivated 15 months ahead of schedule (page 56).
September	The HAMMER Training Center is dedicated (page 56).
	DOE announces an additional 14 month delay for the K-Basins spent fuel project (page 57).
November	Hanford's last untreated liquid waste stream is diverted to a disposal facility (page 57).
	DOE confirms that leaked tank waste has reached groundwater (page 57).

1998

January	Bechtel is assigned the responsibility to integrate vadose zone and groundwater contamination with its current cleanup activities (page 62).
May	Hanford Site Manager John Wagoner tells a congressional subcommittee hearing that costs for the K-Basins spent fuel project may increase by $276 million and schedules may slip two more years (page 63).
	DOE rejects a bid from Lockheed Martin to construct and operate Hanford's waste vitrification facilities (page 69).

Notable Events/Accomplishments

(1998 continued)

July	N Reactor is deactivated (page 66).
August	DOE awards a contract to BNFL Inc. to move forward with design of a waste vitrification facility (page 69).
September	B Plant is deactivated four years ahead of schedule (page 66).
	The Tri-Parties agree to new schedules for the K-Basin spent fuel project (pages 63-64).
October	Washington Congressman Doc Hastings inserts language into federal legislation that creates DOE's Office of River Protection (page 69).
	C Reactor is successfully put into interim safe storage (page 67).
December	DOE removes 18 tanks from the Wyden Watch List and closes out organic complexants as a tank safety issue (page 69).

1999

January	Hanford workers resume stabilizing plutonium at the Plutonium Finishing plant (page 71).
March	DOE and the State of Washington reach agreement on a court-enforceable schedule for pumping liquid waste out of 29 single-shell tanks (page 72).
	DOE begins operation of its new cross-site transfer line (page 72).
April	DOE releases its final environmental impact statement on proposed land uses for Hanford following cleanup (pages 74-75).
July	DOE adds the K-Basin spent fuel project to a special "watch list" of troubled DOE projects (page 73).
December	DOE announces that Hanford and the Nevada Test Site are its preferred choices for disposal of wastes from other DOE sites (page 75).
	Tank C-106 is removed from the Wyden Watch List (page 77).

2000

January	High concentrations of tritium are found in a monitoring well next to the 618-11 burial ground (pages 79-80).
February	DOE selects Hanford and the Nevada Test Site as disposal sites for waste from throughout the DOE complex (page 80).
March	Ecology Director Tom Fitzsimmons sets milestones and enforcement policies for the construction and operation of tank waste treatment facilities (page 84).
April	BNFL submits a formal cost estimate of $15.2 billion to begin treatment and vitrification of Hanford's tank waste (page 85).
June	DOE terminates its privatization contract with BNFL (page 85).
	President Clinton designates the Hanford Reach as a National Monument Area (pages 81-82).
	The Tri-Parties agree to 11 new milestones for the K-Basins project (page 80).
July	A huge fire burns 192,000 acres on and near Hanford – threatening numerous Hanford facilities (page 82).
	Hanford makes its first shipment of transuranic waste to the Waste Isolation Pilot Plant (page 83).
December	The first spent fuel is removed from the K-West basin (page 80).
	DOE awards a ten year $4 billion contract to a consortium led by Bechtel National to design and construct tank waste vitrification facilities (page 86).

2001

February	SY-101 is removed from the Wyden Watch list (page 95).
	Washington's Pollution Control Board rules that the Department of Ecology can enforce Tri-Party Agreement milestones as soon as they appear in jeopardy (pages 90-91).
May	The Tri-Parties sign the final Record of Decision for the 300 Area (page 92).
August	The last 24 tanks are removed from the Wyden Watch List (pages 95-96).
November	DOE Office of River Protection Manager Harry Boston says DOE is exploring alternatives to vitrifying all of Hanford's tank waste (pages 94-95).

2002

March	DOE, EPA and the State of Washington sign a Letter of Intent to accelerate Hanford cleanup (page 98).
May	Bechtel estimates that construction and testing of the vitrification plant can be completed a year early (page 104).
July	Construction of Hanford's vitrification facilities begins (page 104).
August	Hanford workers remove the 100th canister of spent fuel from the K-Basins (pages 99-100).
	DOE said it would stop burying low-level waste in unlined trenches (page 101).
September	The cocooning of DR Reactor is complete (page 101).
December	Three trucks carrying remote-handled transuranic waste arrive at Hanford (page 101).

2003

March	The State of Washington files suit in federal court to stop DOE from shipping more transuranic waste to Hanford, initiating several other legal actions (pages 107-108).
May	DOE orders its contractors to halt some cleanup work following a fight with Washington over issuance of an Administrative Order (page 108).
June	A coalition of citizens groups announces the filing of a ballot measure in Washington State to ban most waste from coming to Hanford (page108).
July	DOE and the State of Washington agree to a new schedule for the vitrification plant (page 114).
October	New Mexico Governor Bill Richardson orders his Environment Department to change the Waste Isolation Pilot Plant's permit to prevent Hanford tank waste from being disposed there (page 115).
December	The cocooning of F Reactor is complete (page 113).

2004

February	DOE releases the final Hanford Solid Waste Environmental Impact Statement (pages 117-118).
	Workers complete stabilization of all plutonium at the Plutonium Finishing Plant (page 123).
March	Most work at Hanford's tank farms is halted due to worker safety issues related to tank vapors (pages 122-123).
July	Washington announces its intent to expand existing litigation to stop further waste from coming to Hanford (page 118).
August	Hanford workers complete the pumping of free liquids from Hanford's single-shell tanks (page 123).
September	The cocooning of D Reactor is complete (page 126).

Notable Events/Accomplishments

(*2004 continued*)

October	The last spent fuel is removed from the K-Basins (page 124).
November	Washington voters pass an initiative to stop most waste from coming to Hanford (page 119).
December	Construction at the Waste Treatment Plant is slowed due to concern that seismic standards are not accurate (page 129).

2005

July	Errors are discovered in the final Hanford Solid Waste Environmental Impact Statement, resulting in DOE not moving forward with planned waste shipments to Hanford (pages 131-132).
August	DOE awards a seven year $1.9 billion contract for cleanup along the Columbia River corridor (pages 133-134).
September	DOE notifies Washington it may miss a 2011 Tri-Party Agreement milestone to begin full operation of the Waste Treatment Plant (page 138).
October	The cocooning of H Reactor is complete (page 137).
	DOE and EPA sign a Record of Decision for U Plant (page 134).
December	Construction work on the Waste Treatment Plant's pre-treatment facility and high-level vitrification plant is suspended while design changes are made to reflect increased seismic standards (page 137).

2006

January	The Tri-Party Agreement is modified to reflect delays in the schedule for the K-Basin sludge project (pages 141-142).
	DOE agrees to prepare a new Environmental Impact Statement, ending litigation filed by the State of Washington (page 142).
March	An independent panel identifies 28 outstanding technical issues with the Waste Treatment Plant (Page 148).
June	Bechtel provides new cost ($11.55 billion) and schedule estimates for the Waste Treatment Plant (page 149).
	The first test holes are drilled to determine seismic vulnerability of the Waste Treatment Plant (pages 149-150).
July	A Federal District Court Judge rules that Initiative 297 is unconstitutional in its entirety (page 144).
December	Waste retrieval is completed from three Hanford tanks during the year (page 143).

2007

January	DOE's official cost estimate for the Waste Treatment Plant increases to $12.26 billion (page 161).
March	EPA levies its largest fine ever at Hanford after an employee is found to have falsified records at the Environmental Restoration Disposal Facility (pages 153-154).
	Hanford workers locate a major source of chromium near D and DR reactors (page 155).
May	Sludge in the K-East basin is successfully moved to the K-West basin (page 156).
July	About 85 gallons of high-level radioactive waste spills onto the soil in Hanford's S Tank farm (pages 157-158).

(2007 continued)

August Hanford is identified as a potential site for disposal of Greater-Than-Class C waste (page 157).

A range fire blackens most of the Arid Lands Ecology Reserve and Rattlesnake Mountain (page 159).

September The State of Washington indicates a willingness to accept multi-year delays in the start of the Waste Treatment Plant and tank waste retrieval, in return for an increased focus on groundwater treatment (pages 155-156).

DOE determines that Hanford's surplus plutonium will be consolidated at the Savannah River Site (page 159).

Full construction resumes at the Waste Treatment Plant (pages 160-161).

2008

January Hanford workers complete vacuuming up remaining sludge from the floor of the K-West basin (page 165).

March The U.S. Department of the Interior designates Hanford's B Reactor as a National Historic Landmark (page 170).

May The Ninth Circuit Court of Appeals upholds a Federal District Court ruling that Initiative 297 is unconstitutional (page 167).

Hanford workers complete the installation of a temporary cap over the T Tank farm (page 167).

November DOE notifies the State of Washington and EPA that 23 Tri-Party Agreement milestones for projects in the Central Plateau are at risk due to expected funding shortages (page 167).

The State of Washington files suit in federal court, seeking enforceable deadlines for the Waste Treatment Plant and tank waste retrievals (pages 163-164).

2009

February Congress passes the $790 billion economic stimulus bill, which leads to $1.961 billion for Hanford cleanup (pages 173, 174, 175).

Oregon joins litigation filed in 2008 by the State of Washington over Waste Treatment Plant milestones (page 183).

March The Ninth Circuit Court of Appeals affirms the State of Washington's authority over mixed nuclear hazardous and radioactive transuranic waste buried at Hanford (page 178).

July A groundbreaking ceremony is held for the start of construction of the 200 West groundwater pump-and-treat facility (page 181).

August DOE, Washington and Oregon announce a tentative settlement to litigation over Waste Treatment Plant milestones (page 183).

September Workers complete demolition of the K-East fuel storage basin (page 179).

October DOE releases the draft Tank Closure and Waste Management Environmental Impact Statement (pages 179-180).

December Plutonium storage vaults in the Plutonium Finishing Plant are opened for public tours after transfer of 2,300 canisters of plutonium to the Savannah River Site (page 181).

Notable Events/Accomplishments

2010

July	Hanford workers complete the relocation of about 120 large contaminated pieces of equipment from the U Plant's deck into its processing cells, in preparation for eventual demolition (page 186).
	The Blue Ribbon Commission on America's Nuclear Future tours Hanford and hears from a variety of local and state officials (page 192).
	Hanford whistleblower Walter Tamosaitis writes to the Defense Nuclear Facilities Safety Board, saying he was removed from his job for raising safety concerns with the Waste Treatment Plant design, setting off a series of investigations (pages 193-194).
September	An interim barrier is constructed over the entire TY tank farm (page 187).
October	The U.S. District Court in Spokane approves and enters a judicial consent decree with a new enforceable schedule for retrieving and treating Hanford's tank waste (page 194).
November	High levels of radioactivity are discovered beneath a hot cell in the 324 Building (page 193).
December	DOE announces it will move forward with cocooning, rather than dismantlement of the K-East Reactor (page 190).
	A new groundwater pump-and-treat system begins operation near the D and DR reactors (pages 190-191).
	Cleanup is completed on Rattlesnake Mountain and the Arid Lands Ecology Reserve (page 187).

2011

February	Two new super cells are completed at the Environmental Restoration Disposal Facility (pages 197-198).
May	The Tri-City Development Council requests 1,341 acres of Hanford land for economic development (page 203).
June	The Defense Nuclear Facilities Safety Board concludes that a flawed safety culture exists at the Waste Treatment Plant (pages 204-205).
July	Work begins to exhume waste from the 618-10 burial ground (pages 198-199).
	The Mobile Arm Retrieval System is installed in tank C-107 (page 202)
August	The Hanford Lifecycle Scope, Schedule and Cost report estimates the remaining cost of Hanford cleanup at $115 billion (page 201).
	Construction of the Waste Treatment Plant hits the 60 percent completion mark (page 206).
September	A large number of layoffs occur as most federal stimulus funding is spent (page 201).
October	DOE and EPA issue a Record of Decision for cleanup of liquid waste sites – some of which contain large amounts of plutonium (page 199).
	A new groundwater pump-and-treat system begins operation in the H Area (page 200).
November	DOE notifies the states of Washington and Oregon that consent decree milestones related to the Waste Treatment Plant may be at risk (page 207).
December	A team of executive level nuclear safety experts concludes that the safety culture at the Waste Treatment Plant is not flawed (page 205).

2012

January	DOE's Office of Health, Safety and Security finds problems with the safety culture at the Waste Treatment Plant (page 218).
June	The cocooning of N Reactor is complete (page 212).

(2012 continued)

August	The 200 West groundwater pump-and-treat facility begins operation (pages 213 and 214).
	Energy Secretary Steven Chu assembles an expert panel to begin reviewing technical problems at the Waste Treatment Plant (pages 218-219).
	Construction slows at the Waste Treatment Plant's pre-treatment facility and high-level waste vitrification facility, to allow time for technical issues to be resolved (pages 218-219).
September	Hanford workers remove the first of the highly radioactive sludge from the K-West basin (page 214).
	Hanford workers complete waste retrievals in two tanks – the ninth and tenth to be emptied (pages 210-211).
	Surface cleanup at the F Area is complete (page 213).
October	Double-shell tank AY-102 is determined to be leaking from its inner shell (pages 209 and 210).
December	DOE releases the final Tank Closure and Waste Management Environmental Impact Statement (pages 216 and 217).

2013

January	Oregon Governor John Kitzhaber and Washington Governor Jay Inslee both suggest that new waste storage tanks are needed at Hanford (page 225).
February	DOE announces that liquid levels in tank T-111 are decreasing (pages 222-223).
	After meeting with Energy Secretary Chu, Washington Governor Jay Inslee announces that five additional single-shell tanks are leaking (page 223).
March	Hanford's budget is reduced by about $156 million due to federal budget cuts (page 221).
	DOE announces a preferred alternative to send up to 3.1 million gallons of tank waste to the Waste Isolation Pilot Plant for disposal (pages 229-230).
June	DOE notifies the State of Washington that it will take about 19 months to buy and install equipment to begin pumping tank AY-102 (page 224).
September	DOE releases a framework for tank waste retrieval and treatment (page 230).
November	DOE says just one, not six single-shell tanks are leaking (page 223).

2014

February	Oregon Senator Ron Wyden says a review of double-shell tank construction reports shows as many as 20 of Hanford's 28 double-shell tanks may have serious flaws or otherwise be compromised (pages 234-235).
March	DOE releases a new pumping plan for tank AY-102 (pages 233-234).
	Ecology issues an Administrative Order, directing DOE to begin removing waste from tank AY-102 by September 2014 (page 234).
	DOE's Inspector General says DOE should move expeditiously to move 1,936 cesium and strontium capsules to dry storage (pages 236-237).
	DOE and Ecology submit separate proposals to modify an existing Consent Decree related to tank waste retrievals and treatment (pages 239-240).
March/April	Tank vapors sicken 26 Hanford tank farm workers (page 235).
April	DOE appeals Ecology's Administrative Order for tank AY-102 (page 234).
	DOE and Ecology reject the other's proposals to modify the existing Consent Decree (page 240).
	Ecology triggers the dispute resolution process related to the Consent Decree (page 240).