

Hanford

Clean-up or Cover-up?

Did we get the truth on Earth Day?

Claude Zeller, Ph.D.

Earth Day 2009

A brief history in 6 steps

- August 2, 1939 Letter of Albert Einstein to President Roosevelt
- December 2, 1942 1st controlled nuclear chain reaction (Enrico Fermi - University of Chicago)
- March 1943 Beginning of Hanford construction for Plutonium Production
- February 4, 1945 Reactor B in full power
- June 12, 1945 Enough Plutonium for 2 bombs
- August 9, 1945 "Fat Man" bomb dropped on Nagasaki

F.D. Roosevelt,
President of the United States,
White House
Washington, D.C.

Sir:

Some recent work by E.Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. Certain aspects of the situation which has arisen seem to call for watchfulness and, if necessary, quick action on the part of the Administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendations:

In the course of the last four months it has been made probable - through the work of Joliot in France as well as Fermi and Szilard in America - that it may become possible to set up a nuclear chain reaction in a large mass of uranium, by which vast amounts of power and large quantities of new radium-like elements would be generated. Now it appears almost certain that this could be achieved in the immediate future.

This new phenomenon would also lead to the construction of bombs, and it is conceivable - though much less certain - that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air.

Albert Einstein
Old Grove Rd.
Massena Point
Peconic, Long Island
August 2nd, 1939

-2-

The United States has only very poor ores of uranium in moderate quantities. There is some good ore in Canada and the former Czechoslovakia, while the most important source of uranium is Belgian Congo.

In view of this situation you may think it desirable to have some permanent contact maintained between the Administration and the group of physicists working on chain reactions in America. One possible way of achieving this might be for you to entrust with this task a person who has your confidence and who could perhaps serve in an unofficial capacity. His task might comprise the following:

a) to approach Government Departments, keep them informed of the further development, and put forward recommendations for Government action, giving particular attention to the problem of securing a supply of uranium ore for the United States;

b) to speed up the experimental work, which is at present being carried on within the limits of the budgets of University laboratories, by providing funds, if such funds be required, through his contacts with private persons who are willing to make contributions for this cause, and perhaps also by obtaining the co-operation of industrial laboratories which have the necessary equipment.

I understand that Germany has actually stopped the sale of uranium from the Czechoslovakian mines which she has taken over. That she should have taken such early action might perhaps be understood on the ground that the son of the German Under-Secretary of State, von Weissacker, is attached to the Kaiser-Wilhelm-Institut in Berlin where some of the American work on uranium is now being repeated.

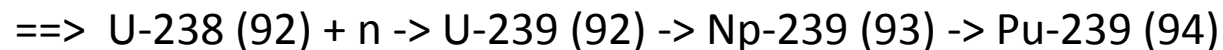
Yours very truly,
A. Einstein
(Albert Einstein)

Why Hanford?

- **Plutonium Manufacture and Fabrication for Weapons**

- All plutonium originates in nuclear reactors and is produced by the capture of extra neutrons by uranium:

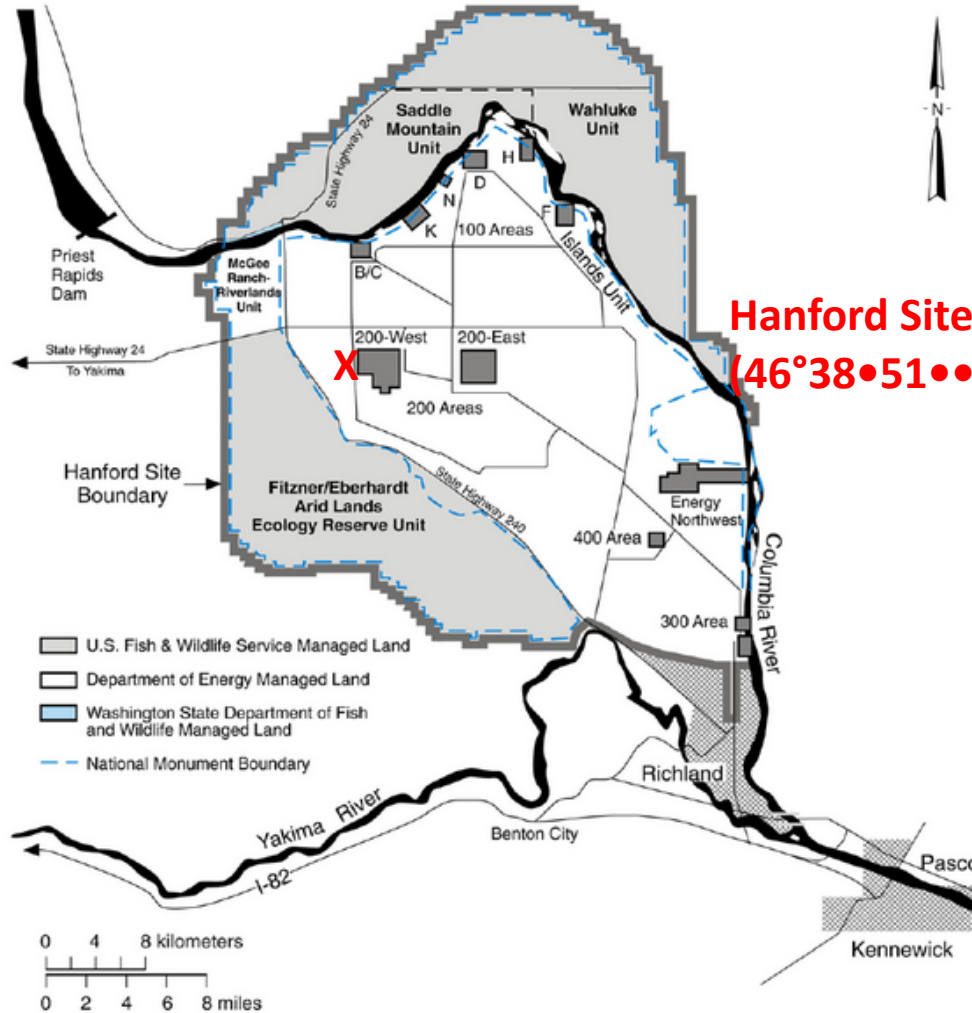
- U-238 to form U-239, which then undergoes a series of decays to form Pu-239:



- **The isotopic composition of plutonium is affected by how long it stays in the reactor.**
- Some of this plutonium gets consumed by fission before it is removed from the reactor, and some of it gets transmuted to heavier isotopes of plutonium by capturing more neutrons:
- $\text{Pu-239} + n \rightarrow \text{Pu-240}$ (Risk of predetonation of the bomb, the isotopic composition matters with regard to manufacturing weapons)
- **Short exposures (~100 days for reactor B) produce plutonium with very little Pu-240 and with very little plutonium being consumed by fission.**
- **That's one reason of the huge amount of wastes generated at Hanford.**

Where is Hanford?

The map is not on my GPS



**Hanford Site according to Suzy
(46°38'51"••N 119°35'55"••W)**

Very Inviting Area



Hanford-Nuclear-Past



The historic *B Reactor*



DEPARTMENT OF ENERGY

The historic B Reactor at the Hanford nuclear reservation, the source of plutonium for the "Fat Man" bomb, was closed in 1968. This photo was taken in the late 1940's, when the plant was in full production.

Hanford N Reactor



“Tank Farms”

- To receive the highly radioactive wastes from the chemical separations process, the HEW built:
 - 64 single-shell underground waste tanks between 1943 and 1946.
 - 112 double-shell (most of them) underground waste tanks during the Cold War.

Hanford WWII tank farm



Hanford waste tank



Hanford site tank interior (Now)



“La bonne soupe”

Nuclear Waste: then and now

Nuclear Waste Management (WWII)

- **Release of nuclear wastes in the environment (air, river, ground) including leaks (gas, liquid) (Unknown)**
- **Disposal of radioactive items (equipment, sludge, ...) (in barrels, caskets, ...) in trenches (no inventory)**
- **Use of 177 storage tanks totaling 53 M gallons of highly radioactive liquid wastes (Tank Farms)**

Cleanup (since 1989) (world's largest environmental cleanup)

- Dismantlement of ALL the nuclear facilities (well underway)
 - 8 reactors facilities and 3 Plutonium processing plants and their associates “cooling” pools
 - Cocooning of all reactors
- Environmental Restoration Disposal Facility (ERDF) (Huge Central Landfill)
 - To receive ALL dismantlement materials
 - To receive ALL now inventoried trenches contain
 - To receive ALL radioactive top-soil
- Waste Vitrification Plan only for highly radioactive materials (tanks and pools liquid content/sludge) (in very slow progress since 2001, completion facility 2019, vitrification ~2050)
- Pumping and filtering stations (a real joke!!)

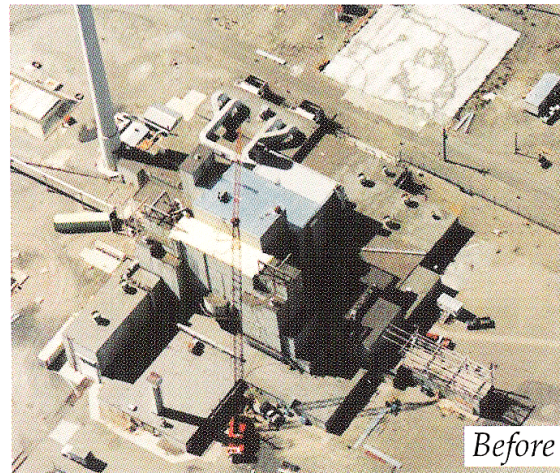
Cleaning Up the Hanford Site



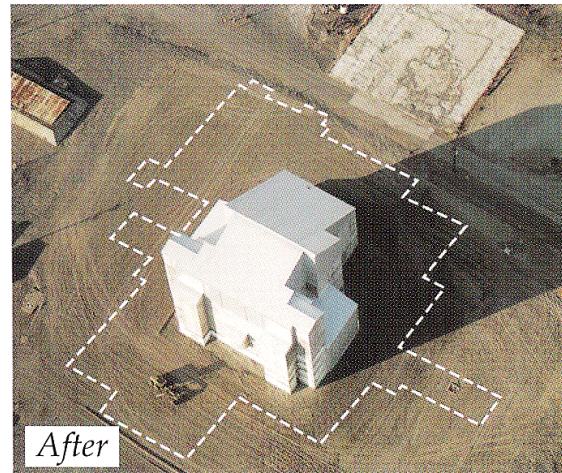
Remediating waste sites and burial grounds, then safe disposal of the contaminated material



Demolition of surplus contaminated facilities



Before



After

Cocooning retired plutonium production reactors (DR Reactor shown before and after cocooning project - this is the possible fate of B Reactor if not preserved as a museum)

Decommission of D-Reactor



Cleaning Up the Hanford Site



OTHER SIGNIFICANT HANFORD CLEANUP

Environmental Restoration Project:

- The original Environmental Restoration Disposal Facility (ERDF) cells are full and wastes are now being disposed in new cells built to meet expansion needs as cleanup proceeds. To date, the Bechtel Hanford-led Environmental Restoration Contractor (ERC) team has removed nearly 2.4 million tons of contaminated soil and debris from cleanup sites along the Columbia River and safely disposed of it in the ERDF.
- In a four-month “spring cleaning” effort, the ERC team safely removed nearly 80 tons of legacy waste from the K East and K West reactors, working in concert with Fluor Hanford’s preparations to remove spent fuel from the K Basins. Legacy waste refers to spare parts, tools and equipment abandoned in place after closure of the reactors.
- Decontamination and decommissioning work by the ERC team continues at plutonium concentration facilities in 200 West and 200 East.
- Reactor interim safe storage, or cocooning, of the DR and F reactors is under way.



To date, 16 wells have been drilled to inject a barrier that prevents toxic chromium from spreading underground to the Columbia River.

OTHER HANFORD CLEANUP



Up and Down

- UP (Lessons to learn)
- Fantastic engineering job
- Speed with research in the critical path
- Team of top scientists (Giants) working with top engineers from DuPont
 - Not always smoothly
- Redundancy of knowledge, created expertise on the run
- Over-engineering was the key to success
- Effective Technical Management with no MBAs and WPE

- DOWN (environmental irresponsibility.. They didn't know..(??!!))
- Disregard for long term waste storage concerns (tanks, trenches)
- **Release of nuclear wastes in the environment (air, rivers, ground).**
 - **We have to live with the legacy..**

- Mysteries and Discrepancies
- 120 kg of Plutonium (WWII) ==> 65 waste storage tanks
- 65,000 kg of Plutonium (Cold War) ==> 112 waste storage tanks (factor 300 in concentration???)

But Irreparable Damages to the Environment

“This Land is your Land”

Woody Guthrie

- 270 billion U.S. gallons (1 billion m³) of contaminated groundwater as a result of the leaks and cognizant dumping of liquid wastes (not documented or classified)

“River of Dreams”

Billy Joel

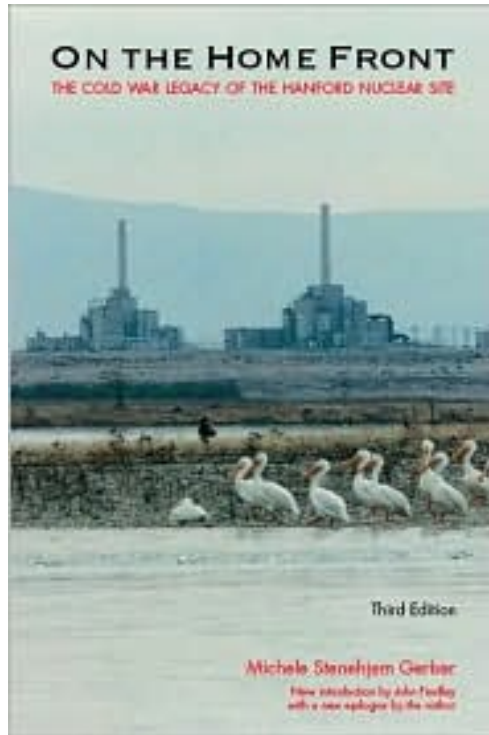
- A huge volume of water from the Columbia River was required to dissipate the heat produced by Hanford's nuclear reactors.
- By 1957, the eight plutonium production reactors at Hanford dumped a daily average of 50,000 curies (1,900 TBq) of radioactive material into the Columbia River. These releases were kept secret by the federal government.

“Blowin' In the Wind”

Bob Dylan

- The plutonium separation process also resulted in the release of radioactive isotopes into the air, which were carried by the wind throughout southeastern Washington and into parts of Idaho, Montana, Oregon, and British Columbia.
- Downwinders were exposed to radionuclides, particularly iodine-131, with the heaviest releases during the period from 1945 to 1951. These radionuclides filtered into the food chain via contaminated fields.

Perceived Danger is a Political Issue!!



On the Home Front: The Cold War Legacy of the Hanford Nuclear Site, by Michele Gerber (ex-Activist and now Government Historian)

(1990 Report and History from declassified information/documents “as is” => Very disturbing facts about release of nuclear wastes in the environment (air, river, ground) but no health assessment at all.

The results of the quantitative toxicology/health studies (in the '50s) on human (extremely controversial) and “downwinders” are still classified (Plutonium, Iodine-131)

The Hanford Health Information Network (HHIN) created in 1994 was closed in May, 2000 by the Bush Administration.

(Very spotty results, but conclusion of a real danger).

Current information is now available through the Agency for Toxic Substances and Disease Registry of the U.S. Centers for Disease Control and Prevention.

(Conclusion: the danger was minimum and there are no hard evidences of effects on the population!!)



But Perceived Danger is now recognized

Benefit Information

for

**Atomic Weapons
Industry Workers
and Their Survivors**



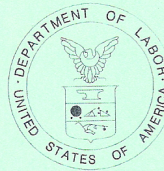
**Legacy of Hanford Health Information Network:
The department of Labor established in 2001 the
Occupational Illness Compensation Program Act
for workers in the Atomic Weapon Industry...**

Did you **Work at Hanford/PNNL?**

Did your Parents **Work at Hanford/PNNL?**

Did your Grandparents **Work at Hanford/PNNL?**

Do You Know someone **who worked at Hanford/PNNL?**



The **Energy Employees Occupational Illness Compensation Program Act** was established in 2001 to provide compensation and medical benefits for workers in the Atomic Weapons Industry. If those workers are deceased, their survivors may be eligible for benefits as well.

The Hanford Resource Center provides assistance to claimants filing claims for benefits. The Department of Labor will coordinate the actual adjudication of the case. However, we are available to assist you, at no cost, throughout the claims process. For those not living in the local commuting area, we can provide assistance by telephone.

Contact Us for More Information

Hanford Resource Center
303 Bradley Blvd., Suite 104
Richland, WA 99352
509-946-3333 or Toll Free: 888-654-0014
Email: hanford.center@rrohio.com

**But for the U.S. Centers
for Disease Control and
Prevention it's not a
concern!!!**

Recent Disturbing GAO Reports

- **Nuclear Waste:** DOE Lacks Critical Information Needed to Assess Its Tank Management Strategy at *Hanford* [GAO-08-793](#), June 30, 2008
- **Securing U.S. Nuclear Material:** DOE Has Made Little Progress Consolidating and Disposing of Special Nuclear Material [GAO-08-72](#), October 4, 2007
- **Nuclear Waste:** Plans for Addressing Most Buried Transuranic Wastes Are Not Final, and Preliminary Cost Estimates Will Likely Increase
- **Nuclear Waste:** DOE Should Reassess Whether the Bulk Vitrification Demonstration Project at Its *Hanford* Site Is Still Needed to Treat Radioactive Waste [GAO-07-762](#), June 12, 2007

Recent Disturbing GAO Reports (Cont'd)

- **Nuclear Waste:** DOE's Efforts to Protect the Columbia River from Contamination Could Be Further Strengthened [GAO-06-1018](#), August 28, 2006
- ***Hanford* Waste Treatment Plant:** Contractor and DOE Management Problems Have Led to Higher Costs, Construction Delays, and Safety Concerns [GAO-06-602T](#), April 6, 2006
- **Department of Energy:** Preliminary Information on the Potential for Columbia River Contamination from the *Hanford* Site [GAO-06-77R](#), November 4, 2005

Notes

Cover-Up (Yes or No?.... Or something else?)

The Expertise Disappearing

- Aging of ex-Hanford workers
- Cold War medical study still classified and remaining experts still bound by secrecy
- The Agency for Toxic Substances and Disease Registry doesn't have the necessary expertise and information and maybe the willingness to assess the real long term health problem
- The GAO is monitoring the situation and the Department of Labor is doing its best under bureaucratic rules..
- Nobody is volunteering the information.. Hanford is safe as long as you don't walk or work in the contaminated area...

Clean Up (Since 1989)

- Environmental Restoration Disposal Facility (ERDF) (Huge Central Landfill) seems effective but only deals with the superficial and not very radioactive pollution (structures, equipment, top soil, buried items)

Conclusion (Then and Now)

From Decision to Completion (WWII)

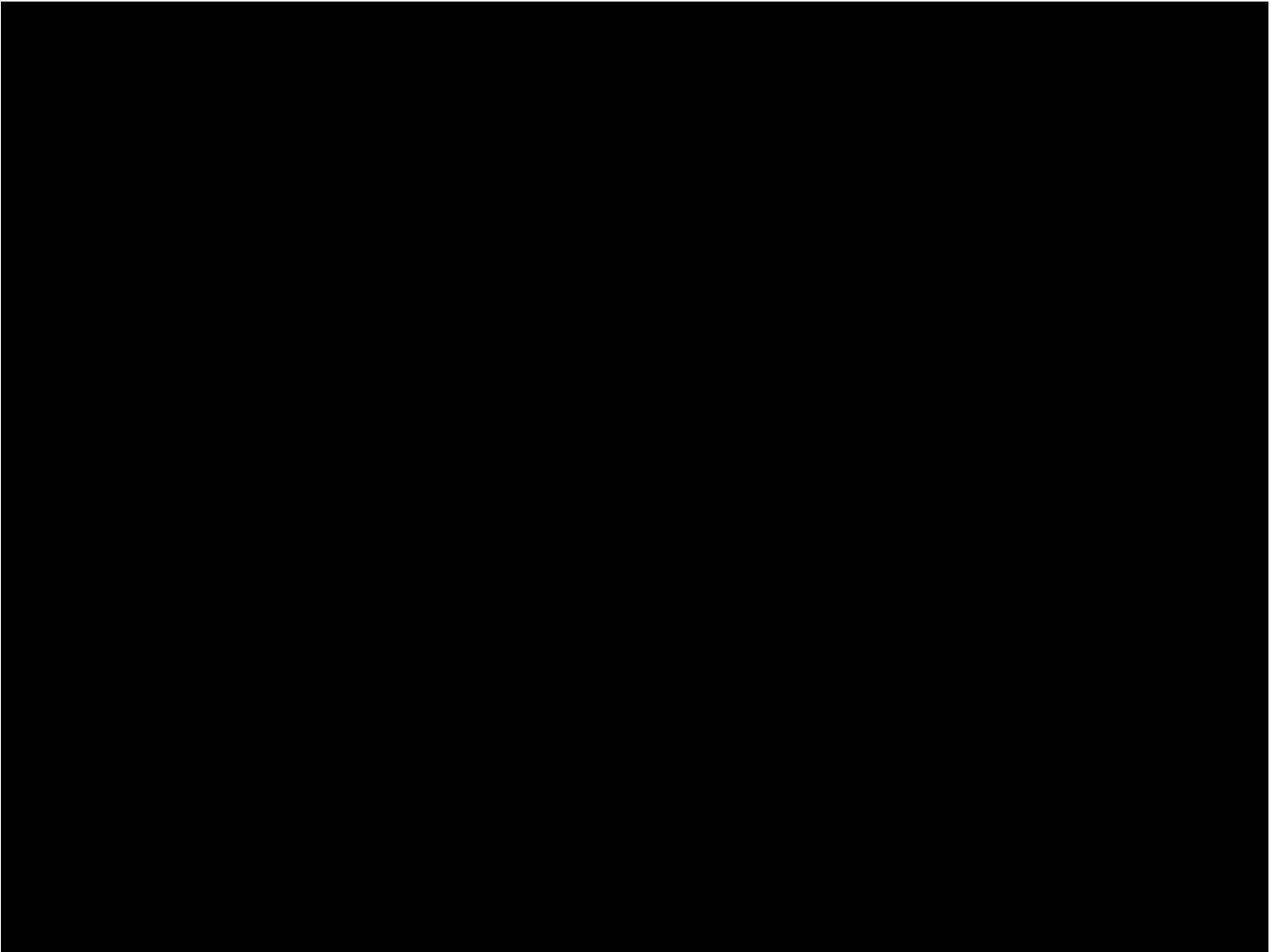
- First Reactor (B-Reactor and 2 brothers) 2 years (1 year for construction, 1 year for ramping-up production)
- Plutonium Processing 3 years (1.5 year for construction)

Plutonium Production: 23 years of pollution (wastes) and irresponsibility (1945 – 1968)

followed by: 22 years of pollution (leaks) and irresponsibility (1968-1989)

From Decision to Completion (clean-up after the Cold War) – since 1989)

- Tank Waste Vitrification Plan 29 years: decision (1990), construction (2001 – 2019)
- then 30 years for the vitrification process (completion of waste vitrification production around 2050, if no unforeseen problems occur)
- Cost overrun (Unions)
- **If everything works well at Hanford there will be most likely at least 40 to 50 years of vitrification process.**
 - **Heterogeneity and various states of aging of the waste complicate the problem.**
 - **The content of all the tanks have not been totally identified.**
 - **No comprehensive reports dealing with waste categorization and preprocessing planning before vitrification.**



Will \$2 billion of Stimulus Package speed up Hanford cleanup?

Breaking News Impact - The Oregonian - OregonLive.com”
5/25/09 6:46 AM

The Hanford Nuclear Reservation is getting nearly \$2 billion in stimulus money for job-generating projects, but the top watchdog over the former nuclear weapons production site questions whether the extra money will reduce cleanup delays.

The U.S. Department of Energy is using the money, about equal to Hanford's annual budget, for scores of construction and cleanup projects at one of the world's largest hazardous-waste sites. The projects include cleaning contaminated groundwater and buried waste along the Columbia River, a high priority for Oregon and Washington regulators.

But the department isn't accelerating long-delayed cleanup of 177 leak-prone underground tanks filled with 53 million gallons of radioactive sludge, notes Gerry Pollet, executive director of Heart of America Northwest, a Hanford watchdog group.

The officials haven't specified how or if the work will shorten the cleanup deadlines. But it should help meet key 2015 milestones for protecting the Columbia, they say, and cleanup deadlines may be shortened later as the work proceeds.

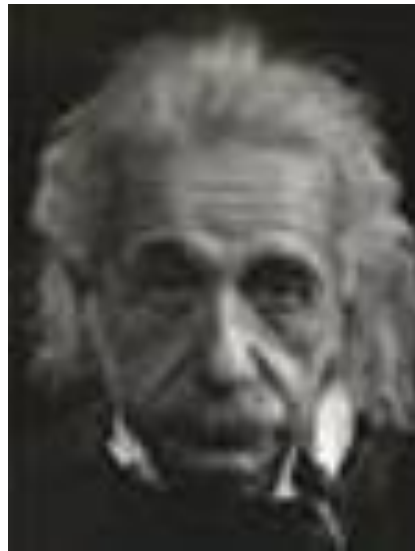
"Our stimulus funding is based on projects where we have a proven track record and can quickly staff up to do the work," Eric Olds, a Department of Energy spokesman, said. "The work on the tank farms is extremely complex."

They really don't know how to deal with the sludge!

Albert Einstein

I could burn my fingers that I wrote that first letter to Roosevelt.

- *(Comment after the bombing of Hiroshima, regarding his letter to Roosevelt warning of the possibility of the development of a nuclear weapon.)*



A CD of additional materials available upon request (zellerpb@earthlink.net)