

# Permanent RadWaste Solutions

Permanent, Safe, and Economical Disposal of High-Level Radioactive Waste\*

[www.permanentradwastesolutions.com](http://www.permanentradwastesolutions.com)

## The Problem of Nuclear Waste Disposal

Since the beginning of the nuclear age, the concern over the disposal of nuclear waste has become one of the primary reasons for the stagnation of the development of nuclear power. Previously, there were only three options available for disposal:

- 1) Shoot it into space and into the sun.
- 2) Store it in containers on the earth's surface.
- 3) Dig a hole and bury it.

The first solution, shooting it into space, is ridiculously expensive and dangerous. It takes at least 200 pounds of fuel to raise one pound of payload into the earth's orbit. Getting it to the sun would take much more. There are up to 42,000 tons of nuclear wastes in the U.S. at this time.

The second solution, storing it in containers on the earth's surface, is what is currently being done. It is very risky due to the threat potential from terrorists, including bombing or crashing an aircraft into the storage pool (wet storage) or the drums (dry storage).

The third solution, digging a hole and burying it, is invalid for any storage for more than a relatively short time due to the lack of long-range data on volcanism, earthquakes, water tables, etc. It requires extensive overland transport. The Yucca Mountain project is an example of this solution. It is very expensive, from 42 to 60 billion dollars at last count. Being the government, it will nearly always cost even more. It won't even be available for use until 2012-2014. The proponents pushing for this site as a nuclear waste repository have stated that no earthquakes occur there. In 1992, an earthquake damaged the DOE's (Department of Energy's) office at Yucca Mountain! Did these researchers just "conveniently" forget that event?

In 1983 the State of Nevada, following the passage of the Nuclear Waste Policy Act of 1982, initiated an independent analysis of hydrology, volcanism, tectonics, seismology and volcanism at Yucca Mountain. The DOE assumptions have ignored all of this.

An example of this is the DOE assumption that there could be no ground water intrusion over the span of 10,000 years. The State analysis showed a very rapid ground water flux through the site in less than 50 years.

Fortunately, Permanent RadWaste Solutions has developed a fourth solution . . .

## A New Solution

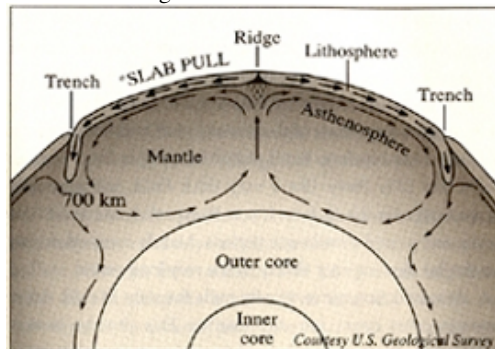
The newest solution, sending the waste to the center of the earth, is the one solution combining safety, economy and permanence to nuclear waste disposal. At first glance, this seems impossible. There has never been a hole drilled in the earth's crust, so how can one be drilled to the center of the earth? The answer? Let the earth itself do the work through known subduction faults.

What is a subduction fault? This is an earthquake fault at the edge of a continental crust that is in collision with the adjoining oceanic crust. Since the continental crust is lighter than the oceanic crust, the latter deflects below the former when the two plates are colliding.

Permanent RadWaste Solutions has developed a process that utilizes a subduction fault for sending the waste to the center of the earth. This has the benefits of being permanent, no maintenance, much less expensive than other proposals, terrorist-proof, and no threat to people, fish, crabs or the environment.

To do this requires burying a specially designed pressure-and-temperature-compensating submersible transport vehicle (STV). It is to be buried in the sediments at a subduction fault.

The following map shows the world locations for subduction faults:



## Where It Starts: Subduction Zones



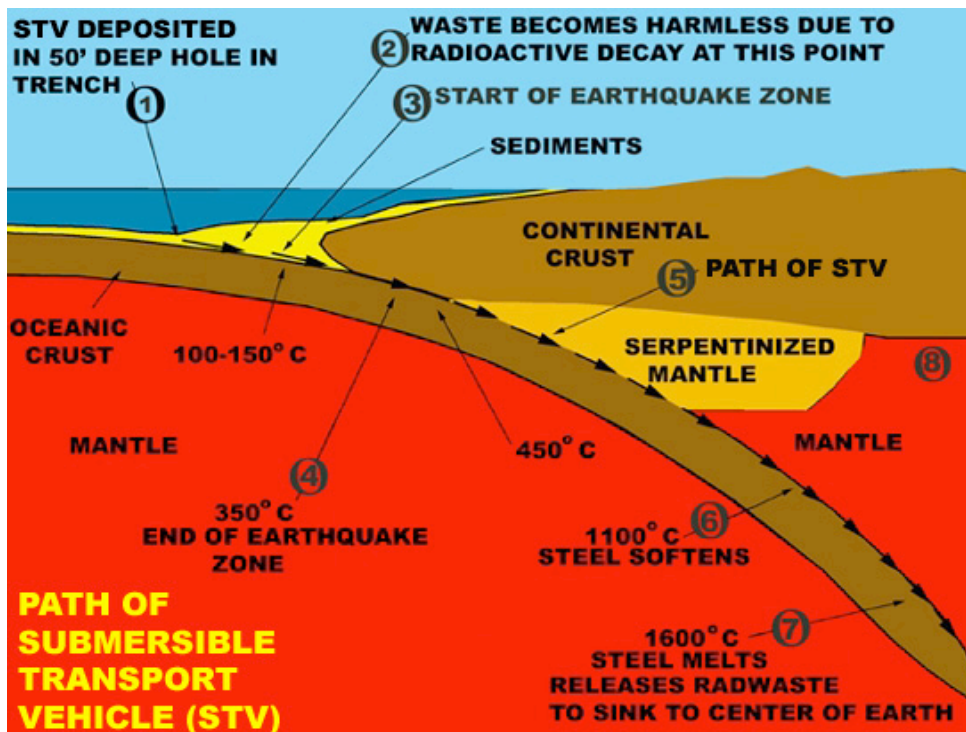
Some notes on the above:

- The **Aleutian Trench** is just south of the Aleutian Island chain. **This is the proposed location for our project.** It has an area of nearly 30,000 square miles.
- The Juan De Fuca is a small trench just off the coast of Washington/Oregon/British Columbia. It is the trench on which the following illustration is based (see next page).
- The West Coast of South America has a large trench called the Peru-Chile Trench.
- The Kurile Trench extends along the east coasts of the Kurile Islands.
- The Mariana Trench extends from Japan to the north coast of New Guinea. This is the deepest trench in the world at 37,000 feet.
- The Ryukya Trench runs roughly from Japan to the Philippine Islands.
- The New Hebrides Trench extends from New Guinea to the east-southeast.
- The Tonga Trench extends from well north of New Zealand to a connection with the Kermadec Trench.
- The Kermadec Trench connects with the Tonga Trench to the north and the North Island of New Zealand to the south. Kermadec and Tonga trenches can be considered as one.
- The Java Trench is a massive trench off the West Coast of Indonesia.

The other trenches on the map are mostly at sea, but two are on land. One of the latter is on the border between India and China while the second is in the Middle East. I consider nothing on land suitable because of the lack of shielding effect from the water and the security problems from terrorists.

The waste would be taken to one of these faults to be buried. Once buried, the STV(s) would eventually travel with the subducting seafloor into the mantle underneath the adjoining continental crust, as shown in the following illustration:

## How Subduction Works



1. At a subduction trench, the STV is buried under the surface of the sediment. The STV will settle to the bedrock surface of the oceanic crust, alleviating the need for more than a 50-foot deep hole.
2. The STV is slowly being pulled into the earth's mantle. Plutonium, the most dangerous of the radioactive waste, has decayed sufficiently to be harmless to the environment. Failure of the system after this point will not expose the environment to radioactive danger.
3. This location marks the beginning of the interplate earthquake zone. The STV is designed to survive subduction earthquakes via design, shape and materials used in the concept. The shape prevents rock from snagging the STV; the material is as strong as the surrounding rock; the design causes pressure exerted on it externally to cause an equal rise in pressure in the interior without STV seal failure.
4. At this point, the STV has heated to about 350-400 degrees Celsius. This is the center of the subduction fault.
5. Now the STV is well below the continental crust and in the area of serpentinized mantle, which is created by the flow of material entering the mantle from the surface.
6. Below about 200 miles in depth, the heat has risen to about 1100 degrees Celsius. At this temperature and depth, the stainless steel begins to soften. The beginning of the failure process of the STV causes the pressure-compensating design to become non-functional. However, the waste may not be released in spite of distortion to the steel.
7. At about 300 miles in depth, the steel finally yields to the increasing temperatures and melts, releasing all waste. Waste plutonium and uranium, being many times heavier than iron and the surrounding magma, slowly sinks through the upper and lower mantles. As it reaches the bottom of the lower mantle, it encounters the outer core, composed of liquid iron, which flows like water at temperatures of several thousand degrees. The spent fuel will go through this area quite easily and come to rest on the outer surface of the inner core.
8. Some lighter elements, such as the fuel rod tubes, may not sink with the spent fuel but slowly rise and stick to the bottom of the continental crust. Depending upon insertion location, these lighter elements could, in millions of years, be ejected out of a volcano. At that time, these materials would be harmless due to radioactive decay.

The path of the STV's descent from the subduction zone to the inner core is **illustrated on the following page:**

## Where It Ends

A. The STV is buried in the sediments on the ocean floor at a subduction fault.

B. After 260,000 years, the danger from spent fuel is gone due to radioactive decay.

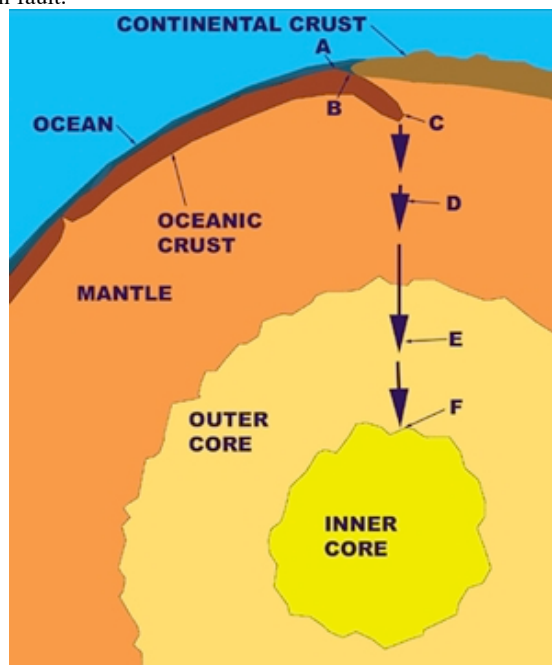
C. The STV reaches a depth where the temperature melts it at 1600 degrees Celsius, releasing the spent fuel.

D. The spent fuel, being heavier than the surrounding semi-plastic mantle, slowly descends toward the earth's center.

E. Once the outer core, made up of liquid iron, is reached, the heavier spent fuel will accelerate downward since the liquid iron flows like water.

F. Finally, the spent fuel will come to rest on the surface of the inner core, made up of solid iron under intense pressure.

Since this process seems so simple and appealing, some people may wonder: Has This Been Done Before?



## Has This Been Done Before?

"In the process of showing my procedure to others, certain people, especially those hearing it second-hand, have misunderstood the concept and assume it is similar to previous disposal attempts that only sound similar.

For example, Robert H. Jones, a consultant for the Department of Energy (DOE), was told a brief and probably inaccurate description of the process. Mr. Jones stated that this idea, to bury radwaste in the seabed north of Hawaii, had been discarded. He had obviously not been told that my process involves a subduction fault to draw a buried submersible transport vehicle (STV) into the interior of the earth. The method he knew about would only hold the radwaste underwater until the barrels corroded.

The Soviets had a cruder method. They packed drums with radwaste and dropped it off the side of surface ships into the Barents Sea. If the drums did not sink, they shot them full of holes. So much for preventing pollution!

In the patent search for my invention, no indications of anything related to subduction fault burial were found.

Also be aware that my process does not dispose of the radwaste in the ocean. It buries it under the ocean. It never contacts seawater, although it uses it as a temporary transit medium (as do nuclear submarines). Thus it will not violate the treaty against dumping radwaste in the oceans.

Further, the STV is slowly drawn into the interior of the earth. Being of a special design, the STV will strengthen and the seals tighten as the pressure increases with increasing depth. When the STV finally melts, about 6-8 million years in the future, the radwaste is released in a zone of molten rock. Being several times the density of the surrounding rock, the radwaste slowly settles toward the center of the earth until it reaches the surface of the inner core.

I invite any reporter or other interested person to ask other competent authority to validate or refute my claim. I would suggest, however, that you give my name and contact information to them so that they may question me and understand exactly how my invention works.

Dean S. Engelhardt

phone: (626) 339-7473

E-mail: [DEngelhardt@earthlink.net](mailto:DEngelhardt@earthlink.net)

I also urge you to double-click on the [Dr. Roy Schall quote](#) on the home page to see his full opinion of my invention."

## Questions & Answers

On the surface, it would appear to me that this process should appeal to everyone. What follows is a series of questions asked of Dean Engelhardt and Glen Parker:



### SAFE AND SECURE DISPOSAL OF HIGH LEVEL NUCLEAR WASTE

#### Thoughts, Reactions and Questions.

*1. We're late in the political process to reverse the decision to place waste at Yucca Mountain. I believe it is now awaiting the Presidents signature. Elected officials in Nevada are very much against the project, but the site seems to be the only viable one in consideration for storage. You are offering a very different approach - not just a better site for storage, but a different approach and method. How could one do a pilot demonstration of your approach to test its creditability? The idea has political baggage in terms of past dumping of waste in oceans that you must overcome.*

A pilot demonstration would consist of testing the capability of my seal to retain integrity in an environment of increased pressures. The other elements of this invention/process are proven already --the steel withstanding up to 1100 degrees Celsius before softening, the depth of the submersible transport vehicle (STV) buried in the seafloor mud being sufficient to protect life directly on top of the mud, and the concept of seafloor subduction. This is all well-known science.

**Nuclear waste has been dropped into the ocean by other processes--and contaminated it. This process does not put radwaste into the ocean. The waste never touches the water nor anything in it. It uses the ocean only as a transit medium via a method that does not contaminate it. It is buried in the sea floor at a location where the subducting action of the tectonic plates will cause it to be pulled under the continental shelf. No ocean water is introduced into this equation.**

*2. What is the life span of these STVs? How can you prove or guarantee this life span? Have the same materials been used in any past experiments? Won't the unique context of the ocean present corrosive impact that might not be predictable now?*

In talking with materials people, I have been told that certain alloys are more long-lived than straight stainless steel. I am still researching this aspect, but the STV only needs to last 260,000 years to allow the radwaste from light-water reactors to decay to harmlessness. Exposing the STV to the elements it would experience for about one million years is the only way of proving this. Obviously, a test would be impossible. The corrosiveness of the ocean can be overcome by encasing the exterior of the entire STV with an anti-corrosive layer. This layer need not be capable of withstanding high temperatures and pressure, as exposure to ocean water will cease once it is buried in the seafloor sediments.

*3. What would happen in a severe earthquake? Could these STVs collide with each other or be squeezed or smashed together? Would the pressure or force of these STVs colliding damage or rupture them?*

The shape of these STVs, coupled with the fact that they are buried in the seafloor sediment layer, would prevent any problems in such circumstances. The STVs are pressure compensating (meaning as the STV goes deeper, the pressure inside the STV equals the pressure on the outside without breaking the seal). They are designed to withstand earthquake activity by being in sediments that undergo increasing pressures, and by being of a shape that will allow them to deflect from rock in a manner similar to squeezing a watermelon seed. They can collide with rocks or other STVs and not be dangerous. There are no flat surfaces to catch on anything. The STVs have more strength than the surrounding material.

*4. How would nuclear waste material be transferred to these STVs? Does this procedure warrant concern for safety? They would still have to travel by truck or train to ports of departure to the ocean.*

Each site generating nuclear waste would empty the contents of the spent fuel rods and load them into the STVs. Once the radwastes are loaded into the STVs, they are never unpacked again. The fact that they are in their final package before leaving the reactor site means that the chances of accidental nuclear exposure during transport is nearly impossible. Barges and ships will ship as much as possible of the radwaste. Some of this must be transported by rail to rivers or the ocean where it can be loaded onto an ocean-going freighter.

*5. How would you keep a record of placement? Is it an advantage to lose track of the location of the STVs? How would you know criteria or standards for number of STVs placed at one site or close together?*

In the general location of the deposits, sonar reflectors similar to what is being used to reacquire a hole by a drill ship can be scattered. At the time of deposit, each STV can be located by triangulation with the reflectors and registered. Do we even want to do this? Once deposited, the problem of recovering a STV would be a major effort even for the United States. (This takes a lot more explanation--which I won't go into here.) The vast area for the Aleutian Trench (30,000 square miles) gives a lot of space, so the STVs do not need to be placed that close together. Surface GPS is helpful to keep records of placement so future placement does not overlap.

*6. What does "permanent" mean? What is a possible time line for life of an STV? Life of nuclear material? How would you ensure a continuing record of the project through tens of thousands of years of human history? Is this important?*

I define "permanent" to mean that the radwaste has decayed through 10 half-lives, which, for the biggest problem of all - plutonium 239 - is a period of 260,000 years. After this period, the material is harmless to the environment and man. A properly-designed (material-wise) STV will last several times that length of time, especially considering the greatly reduced oxygen and higher pressures at these depths. Such records would be unimportant, since the STV, when properly placed, will gradually settle through the sediments until coming to rest on the surface of the oceanic crust. From there, it is carried with the subducting crust down into the mantle. It ceases to be an environmental concern.

*7. Are you sure this is the answer to ensure the future of nuclear energy? Or is it a way to solve a problem plaguing the use of nuclear power that is so complicated and costly that it might solve an old problem but not make nuclear energy any more viable or desirable?*

All this invention/procedure does is to make the disposal of nuclear waste practical and safe. What we do with nuclear power in the future is not what is being addressed.

*8. If a way is found to neutralize radioactive material sometime in the future, will these STVs be recoverable? If not, is this not a disadvantage?*

The STVs would be so difficult to recover in the beginning that I consider them functionally unrecoverable. In the unlikely event that some way is discovered to neutralize the high-level waste, there will almost certainly be sufficient spent fuel not yet disposed of on which to try it out. And why bother?

*9. Are these STVs going to be placed in international waters? What are the tenets of international law regarding the oceans that might hinder or obstruct the placement?*

They will be placed at the subduction fault line. Almost all of these are in international waters. The Aleutian Trench borders the south side of the Aleutian Islands chain, but is still outside the three-mile limit. **Technically, we would be placing them below international waters.** The area could be claimed in the same way that countries claim oil drilling rights in international waters.

*10. If the United States decides to use your method, what is preventing other nations with inferior STVs and methods from dumping their stuff in the oceans for a quick fix that might have disastrous consequences?*

We can never be responsible for what others will do. Various countries, including our own, have dumped nuclear waste without any protection at all, so anything we can do will improve the situation. We could make available these STVs and sell them to any nation needing them.

*11. How much nuclear waste material is now stored in the United States? Other nations? How many STVs would it take to store all this material? Is the project still feasible? Can this method promise safe disposal of future waste?*

The U.S. has about 42,000 tons of radwaste stored at various locations. As we have only 25% of the world's reactors, you can figure about how much is in existence. The 103 reactors in the US create about 2,000 tons more each year. Depending upon size, the STVs would hold between one and four tons of material. You want the STVs to be not so large that subterranean earthquakes would damage the STVs. We could eliminate all of the world's radwaste after having only planted a small field in one subduction trench. (The Aleutian trench has nearly 30,000 square miles.)

I feel that all future waste should be handled this way, as it is the only way to keep it clear of the environment.

*12. What is the relative expense of your method? How does it compare with present proposals for storage? How do you pay for your project given the present budget priorities?*

Yucca Mountain project will cost from 42 to 60 billion dollars when completed. With the ships, barges, and bottom crawler/drilling platform (BC/DP) if necessary, and the appropriate STVs, we could eliminate the nation's radwaste and save up to half of these billions for American taxpayers.

*13. Can you tie in your method with current security concerns regarding terrorism? How is your approach more secure than traditional methods in regard to military conflict and terrorist behavior?*

Terrorists can never recover this waste. The extreme amount of effort to even try to find, much less retrieve, ignoring the problems that I alluded to in question #5, would prevent terrorists from even trying. By contrast, it would take a few miles of tunnel to break into Yucca Mountain, also formidable but much more possible. The highest risk for security is storing the waste on-site as it is now.

*14. Is the proposal strictly for government action? Can/should private corporations play a part?*

This can be operated by either government or private industry, as is the defense industry. When I was taking nuclear physics at UCLA, only cleared students and faculty were allowed in the reactor control room in Bolter Hall.

*15. Who do you have to contact to pursue this project? What kind of professional expertise do you need to further develop this project? Scientific? Political? Environmental?*

Would you believe me if I told you I don't have all of the answers, especially to these questions? If the project goes forward, engineers, chemists and materials specialists would finish the design. But nothing in this project's design is a serious problem.

*16. An environmental argument must include permanent and safe disposal, but if your proposal is thought to open the way to make nuclear energy viable in the future, most environmental organizations would still oppose your approach.*

This statement implies that environmentalists will object to any solution put forward to make nuclear power safer and cleaner. By that thinking, nothing that will clean up the nuclear waste problem will be acceptable because some in government will always feel that this will make nuclear power more viable due to the removal of certain objections to it. By that thinking, environmentalists will oppose any viable solution. (See answer to #7).

This reminds me of the media that sensationalized a story of a train carrying napalm that many felt too dangerous. But gasoline tankers go through there all of the time and no one cares. Napalm is jellied gasoline and is less likely to explode in an accident than liquid gasoline due, in part, to a lack of concentration of explosive vapors. This shows a lack of understanding of relative risks fostered by the media seeking sensationalism to drive up ratings.

At the present time, coal and oil-fired generators emit a great deal of CO<sub>2</sub> and radiation into the air by releasing it from coal and oil in orders of magnitude greater than nuclear power. Granite buildings exhibit radioactive decay. By contrast, nuclear power plants (barring severe accidents) are much cleaner in every respect. I have a personal dosimeter I used inside the control room at UCLA, and I took it to the load-out of Unit 2 at San Onofre. I detected the same level of background radiation that I did in Covina and other bedroom communities. This high-level waste is currently in pools of water at the generating site. Using radiation-proof STVs to put it under five miles of seawater and 50 feet of sediments is much safer in every way. I detected much more radiation emitting from a dinner plate made in Mexico.

The interior of the earth is so hot that much of the rock is in liquid form. Three things generate the heat: the intense pressure near the center of the planet, the flexing of the earth's crust due to tidal action, and radioactive decay. Please keep in mind that plutonium is very heavy. It has a specific gravity of over 30. (Lead is 12). When the STV finally fails due to melting, the heavy elements will continue down while lighter elements will rise and stick to the bottom of the Continental Crust. It will be more than a billion years before any of this could see the light of day through seafloor spreading. That is much longer than the 10,000 years that Yucca Mountain is to last according to the Department of Energy, and that is much longer than an independent review by the state of Nevada concluded.

Will this work? Scientists, who have been shown this, are in agreement that it will

Regardless of whether you are pro-nuclear, anti-nuclear, or somewhere in between, the essential truth is that the cleaning up of high-level nuclear waste will benefit us all. . . .

**...Which is why we must take action now...**

## **Why We Must Act Now**

The facts supporting global warming are universally supported among scientists. This warming has actually been reduced because of energy being reflected back out into space by particulate pollution, including the contrails of jet airplanes. Dubbed the "global dimming" phenomenon, this has the effect of hiding the warming, and it explains the considerable temperature increases in polar areas where the air is cleaner and there are no jet contrails. The world is generating ever more carbon dioxide, and the effects are now being observed. The examination of ice cores taken from Antarctica has revealed that the "level of CO<sub>2</sub> is higher now than at any time in the last 650,000 years. Since temperature records have been available, the ten hottest years have all been in the last fourteen years, and the hottest was 2005."

There are other consequences from all this CO<sub>2</sub>. The glaciers in Glacier National Park will be gone in several years. Antarctica and Greenland contain 70% of the fresh water on earth, held there in the form of ice, but those glaciers are calving huge sections of ice at an alarming rate. At the same time, the oceans are starting to warm. As they do, the water will expand and raise sea levels even more. World wide, hundreds of millions of people living in low-lying areas close to the oceans would become refugees. This can happen within the lifetimes of many living today.

Even now, polar bears are drowning. The ice they go out on every year is breaking up before the polar bears can return to land. The ice forms later every fall and melts sooner every spring. If large areas of permafrost are allowed to thaw, that can release huge amounts of CO2 and Methane. (Methane is 21 times worse than CO2 for causing global warming.) This will cause global warming to accelerate with no way to stop it.

This planet is the only one we have. Big steps will have to be taken in the near future to correct the mistakes we have made. They have to happen sooner, not later.

Burning coal, oil, and gas generates the vast bulk of the power generated in America. Millions of tons of carbon dioxide are added to the air every day, and that process continues unabated. Coal is the source of the acid rain in the northeast and the major reason for the mercury in fish. It also emits more radiation than any nuclear plant in America.

Even the founder of Greenpeace is now supporting the fact that nuclear power is the only way to provide the large amount of electrical energy that America demands. Many environmentalists agree but resist only because there has been no provision for what to do with the nuclear waste. Imagine a new generation of nuclear power plants to replace some of the worst polluting fossil-fuel burning power plants. Think of all the carbon not burned.

Permanent RadWaste Solutions provides the answers that will help save the world!

The generation of nuclear power in this country has never killed anyone. It produces almost no pollution of any kind in the air or water. Coal and oil-fired plants produce and release a significantly greater amount of radioactive contamination. So while thousands of Americans have died from the mining of coal, nuclear waste has the *potential* of danger. That is what we are addressing.

The nuclear waste issue will continue to grow as we find that wind and solar power can never hope to generate more than a small fraction of our needs. Hydropower depends on sufficient rain to fill reservoirs. The construction of dams has consequences to fish swimming upstream to spawn and the navigability of rivers for commerce.

The utilities operating the nuclear power plants have paid \$24 billion to the Department Of Energy (DOE) to provide for the disposal or long-term storage of the existing nuclear waste by 2000. The lawsuits for that could greatly exceed the cost to taxpayers compared to the savings and loan scandals years ago. The DOE must provide specific performance and remove the nuclear waste as was agreed to. Yucca Mountain is a huge hole to throw money at that has cost over \$3 billion, and it is likely that it will never be able to obtain NRC certification.

The Nuclear Energy Institute (NEI), a lobbying organization representing the nuclear power industry, has complimented us by saying our "proposal is intriguing." But they then told us that Yucca Mountain is the "law of the land" because of the \$24 billion already invested into the fund to build it, \$3.3 billion of which has been spent thus far. That \$24 billion will be only a small fraction of the cost of developing the Yucca Mountain project. The total is now predicted to be \$66 to \$80 billion, or possibly even higher. And that is only for the waste produced so far. It is clear that there will be an ongoing need to remove nuclear waste. Permanent RadWaste Solutions has the answer.

We are preparing a proposal to the DOE, but they cannot license our technology without an act of Congress signed by the president.

The innovative method of disposal from Permanent RadWaste Solutions is safer, more economical, and more secure than any other, and can benefit providers of nuclear energy around the globe.

It is more imperative than ever that this process be investigated.

Please contact your local and national representatives and request a review of **Permanent RadWaste Solutions**.

## Testimonial

Roy F. Schall, Jr., Ph.D.  
Glendora CA  
Fax: (626) 914-0241

January 3, 2002

To Whom It May Concern:

I, Roy F. Schall, Jr., Ph.D., former director of research for clinical and diagnostic instruments and reagents and holder of an earned Doctorate in Nuclear Chemistry (1969) from Carnegie Mellon University, Pittsburgh, PA, have witnessed and evaluated a method for disposal of highly radioactive waste designed and in development by Dean S. Engelhardt of Los Angeles CA. The method involves encapsulating this extremely dangerous waste in a stainless steel vessel of special design. The filled capsule is then dropped into the mud at a tectonic plate subduction zone of the earth's crust where in a short geological time it will be drifted with the continental plate under the crust of the earth where its chemical and radiological toxicities will lie

harmless for the ages.

I consider this idea to be an excellent method of disposal for these dangerous byproducts of nuclear fission. The depths of water where continental plate subduction occurs is so great that retrieval by man would be most difficult and expensive once the capsule has been dropped or lowered. Once the capsule is embedded into the mud at the bottom of the ocean, it will sink slowly further into the mud making it harder to retrieve. The capsule or vessel itself is of novel design and will compress and strengthen as pressure rises around it at great water depth. In time, movement of the subducting crust will sweep along the capsule underneath a continental plate where it will become impossible to retrieve and safe from accidental or intentional retrieval. Use of salt water resistant materials for the capsule will ensure that corrosion will not release the contained waste until it is finally buried where it can do no harm.

This method seems a practical, safe and inexpensive method for high level, long lived radioactive waste disposal when compared to current methods being contemplated and developed.

Witnessed and signed this 3rd day of January, 2002 in Glendora CA:

Roy F. Schall, Jr., Ph.D.

## Contact Us

**Roger Boyd**

*Business Manager*

[r1boyd@charter.net](mailto:r1boyd@charter.net)

**Dean Engelhardt**

*Program Manager & Principal  
Investigator*

[DEngelhardt@earthlink.net](mailto:DEngelhardt@earthlink.net)

**Glen Parker**

*Marketing Manager*

[glenlparker@gmail.com](mailto:glenlparker@gmail.com)

**Aron Parker & Alan  
Parker**

*Web Designers*

[email4ap@yahoo.com](mailto:email4ap@yahoo.com)

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