Columbia Riverkeeper

Columbia Riverkeeper's comments on the draft supplemental environmental impact statement.

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CC:
Edward Holbrook,
Deputy Program Manager
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Washington State Department of Ecology

Dave Einan
U.S. Environmental
Protection Agency
Hanford Project Office

Submitted electronically via: https://nw.ecology.commentinput.com/?id=4jW75ZF9Y & https://nw.ecology.commentinput.com/?id=Jx2NYMS7ap

Re: Supplemental Comments on Perma-Fix Northwest Supplemental EIS and Permit Renewal

Dear Daina McFadden, Edward Holbrook, and Washington Department of Ecology:

Columbia Riverkeeper and our members and supporters commend the Washington Department of Ecology (Ecology) for extending the public comment period and conducting a public meeting to help the public understand the Draft Supplemental Environmental Impact Statement (SEIS) and the draft permit renewal for Perma-Fix Northwest. We appreciate the staff time, details shared, and context that help us provide the following comments.

1. **Cumulative Impacts of Increased Development in this Area**

Going forward, the public and stakeholders will require more information about nearby actions that cumulatively impact the Columbia River and communities who live, work, and use

resources—including the River itself—near the Perma-Fix Building and the Hanford Site's 300 Area. The SEIS' cumulative impacts section, 5.13, concludes that nearby sources and "LLF operation and the continuous MWF operation under any action alternative, would contribute to cumulative impacts on air quality and human health elements." Draft Supplemental Environmental Impact Statement, Perma-Fix Northwest Mixed Waste Facility Dangerous Waste Permit Renewal, 124 (2025) [hereinafter SEIS]. Nearby sources included the Hanford Site, along with the Columbia Generating Station (located in Hanford's 300-Area) as sources with potential radioactive and nonradioactive air emissions. SEIS p. 123. Section 5.13 lacks significant discussion of how LLF operation and continuous MWF operations will specifically contribute to impacts on air quality and human health elements. What impacts? How will they contribute? What impacts are there already in this area because of existing Perma-Fix operations and the other sources listed in this section? What are the numeric increases expected?

Hanford's impacts extend beyond its boundaries, and the establishment of new industrial uses on Hanford's boundary in Richland may receive impacts from Hanford, or vice versa, over generations. Cleanup is complicated, with ongoing studies showing that the River Corridor cleanup is far from complete, even if there are long pauses in surface-disturbing activity, or open air disturbances. The soil, dust, and water pollution emanating from Hanford and impacting regional biota should continue to be the subject of focused study. Just last week, the Yakima River Delta was involved in a wildfire emergency.[1]

In the midst of the effort to clean up Hanford, new sources of pollution are building at its boundary. This seems like a collision that is avoidable, but it will take effort to tend to Hanford's pollution in a way that respects all impacted people, most intensely the people of Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and

[1] See Cameron Pobert, *UPDATE: Richland delta blaze 100% contained but blustery winds could change that*, Tri-City Herald (Mar. 27, 2025) available at https://www.tri-cityherald.com/news/local/crime/article302795354.html#storylink=cpy
(In any context we can conceive of, fires near the Hanford Nuclear Site area are a cause for regional alarm. What evacuation plans are available in instances like these?)

Wanapum people, all of whom were unjustly removed from the area now being proposed for industrial use, with long-term impacts.

2. **Planned Expansion at Perma-Fix Northwest is Setting the Stage for the Facility to Handle Secondary Waste without Public Input.**

We urge caution regarding allowing Perma-Fix to continue expansion plans when DFLAW operations may call on Perma-Fix for the handling of secondary waste. We are unsure which of the alternatives capture the clearest picture of how Energy intends to proceed. Additionally, now that the Draft Supplement Analysis is released for 200 West, we urge Ecology to consider how these operations will overlap in time and space.

How does this permit modification interact with implementation of the Holistic Settlement agreement? Riverkeeper is concerned that with these permit modifications, Ecology is setting the stage for Perma-Fix to be the de facto choice for grouting of Hanford's tank waste, something the SEIS does not discuss. It's taken since 2009 for this permit renewal and since 1998 for a new environmental review, the state of Hanford has changed and by extension the facilities that Hanford cleanup plans to utilize to adhere to the mission. If Perma-Fix Northwest is planning on being a part of this, the permit modification and SEIS must address that. The flaws in analysis may be pursued by comparing current data to the data available at the time of the River Corridor Baseline Risk Analysis, more than 10 years ago, which is publicly available. This would take time to cross-reference. This analysis would be valuable. The end use ideas put forward for Hanford are clearly uncertain.

3. **Does the SEIS Address Cumulative Impacts of Increased Transportation?**

The DNFSB has raised questions about the movement of materials close to the boundary of the Hanford site. If we accept some conclusions from the SEIS, the DNFSB caution regarding a positive unreviewed safety question, and the cumulative impact expectations implied in the potential 200 West tank waste treatment alterations, then the potential exists for movement of grouted or liquid material (diluted and/or treated, presumably) to cause risks close to the boundary of Hanford. DNFSB wrote in its report for the week ending January 24, 2025

> CPCCo declared a Potential Inadequacy in the Safety Analysis (PISA) for the Hanford Sitewide Transportation Safety Document (TSD) because the distances to offsite receptors from a radiological release are closer than those assumed in the TSD. The TSD had not been revised after DOE transferred unused land just north of the 300 Area to local jurisdiction. The resulting change places some transfers within 10 meters of the site boundary. CPCCo subsequently determined that a positive unreviewed safety question exists. Radiological shipments originating south of the Wye Barricade, except Department of Transportation (DOT) compliant and DOT special permit shipments, are prohibited until the safety of the situation is evaluated. This compensatory measure primarily impacts

> shipments onsite from the Pacific Northwest National Laboratory Radiochemical Processing Laboratory.[2]

The waste transportation risk evaluation should take into account keeping both commercial and defense-related activities, both Hanford-related, and more far-afield generators of waste, in mind.

The SEIS writes that

> According to its annual dangerous waste reports (Ecology 2020d), PFNW received 99 trucks delivering the total of 139.2 metric tons (153.4 short tons) of waste to the MWF in 2019. On average, the MWF annually received 101 trucks delivering 182.9 metric tons (201.6 short tons) of waste from 2010 to 2019, as shown in Table 11. Table 11 shows that the majority of waste processed in the current MWF operation comes from the Hanford site. In 2019, the MWF received 92 trucks delivering the total of 135.4 metric tons (149.3 short tons) of waste originated from the Hanford site. On average, the MWF annually received 90 trucks delivering 157.2 metric tons (173.3 short tons) of waste originated from the Hanford site from 2010 to 2019.

SEIS p. 31-32. Will this number increase? Since 92 of 99 trucks originate from Hanford, how might this number increase as DFLAW begins operations, if Perma-Fix is utilized? Where do the other 7 trucks originate? If truck transportation is expected to increase at Perma-Fix and in the surrounding areas, does Ecology plan on looking at the potential for increased 6PPD contamination in stormwater runoffs and the impacts to the Columbia River? See generally, U.S. Environmental Protection Agency, 6PPD-quinone, available at https://www.epa.gov/chemical-research/6ppd-quinone.

Additionally, the SEIS states “[c]urrently barge transportation is not used to transport waste to or from the PFNW site. However, PFNW has expressed interest in this capability for LLW in the future.” SEIS p. 39. Does Perma-Fix have the ability to utilize barge transportation without additional environmental analysis or public input? If so, cumulative impacts of utilizing barge transportation in the Columbia River watershed must be evaluated.

Furthermore, we are concerned that the recent DOE analysis for the 200 West Area minimizes the risks but also fails to answer the question of what, truly, the response will be if a major liquid radioactive waste shipment incident were to occur, or if the pyrophoricity or intense radioactivity of waste being disturbed at Hanford should cause issues with regional operations. This comes as a result of the issue being poorly understudied, scoped, and shared in a way that is accessible to the communities most affected by Hanford’s pollution.

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[2] Defense Nuclear Facilities Safety Board. Resident Inspector Report for Week Ending 1.24.2025, p. 1, available at https://www.dnfsb.gov/sites/default/files/2025-03/Hanford%20Week%20Ending%20January%2024%202025.pdf.

The workers, truckers, and other communities around the Tri-CIties have interaction with Hanford pollution, as well as smoke, air emissions, and releases from surprisingly intense weather events (like heavy rainfall, snowfall, wind, fire). Meanwhile the threat of seismic activity at Hanford leaves a lot of questions unanswered about the region's ability to respond to the risks as they stand right now, much less aggravated by cleanup and waste management priorities conflicting with the hope of sustainable long-term stewardship of Hanford, in support of the Tribes' Treaty reserved rights and the right of humans to access clean water where they live.

4. **Additional Questions**

    a. Is Perma-Fix currently considering treating PFAS at its Richland facility? Does it have any hope of doing so in the future? How would this impact the overall environmental burden on the area? What additional permiting and environmental analysis would Ecology require, should Perma-Fix pursue the treatment of PFAS at the Richland facility?

    b. If Perma-Fix is part of the DFLAW program, and operations will begin soon, when will Perma-Fix provide a full assessment of when it expects full operations to begin? What will be the nature of the material? Will it be effluent and/or contaminated equipment and/or secondary waste?

    c. What waste streams are intentionally left out that could be coming to Perma-Fix, and for what reason? We ask the previous question because we want to understand Ecology's assumptions regarding how much waste would come to Perma-Fix in the future, including secondary waste (not the tank waste itself, but rather the things that were used to handle or store the tank waste)?

    d. More data could be helpful regarding the concentration of contaminants within wastes, not just waste volumes, being shipped to Perma-Fix. What wastes, how much, and how regularly are they arriving, both in tonnage and volume? (For example if this is all averaged, you might misunderstand the impact - a large piece of contaminated equipment in need of encapsulation of some kind, which Perma-Fix does, could be voluminous and not that heavy. Other things could be super heavy. All of them could be toxic, and so the concentration of things is also helpful information.) In order to distinguish properly between alternatives, we must have a clear understanding.

5. **Conclusion**

We appreciate Ecology for providing much more analysis and information than what was available prior to this SEIS. However, we are concerned that the basis for allowing Perma-Fix to expand may be unsound, and this asks a fundamental question about the wisdom of relying solely on Perma-Fix for any aspect of DFLAW operations, recognizing that this is already ongoing, apparently - as described in Perma-Fix's own earnings report presentation (link).

We hope that the public process provides an opportunity to explore these issues further, if that makes sense to the people most impacted. There are emergent issues in the Tri-Cities that impact workforce stability across multiple sectors of the economy, impacting greatly the capacity of people to respond effectively to challenges posed to them. We appreciate the work of those who continue to contend with these issues and challenges.

Please see the attached documents for reference.

Sincerely,

Dan Serres[3]

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[3] Most of my knowledge of Hanford comes from Simone Anter and Dirk Dunning, as well as the people and staff of multiple Tribal Nations. I defer to their expertise often. Dirk Dunning's testimony to the Oregon Legislature may be relevant. Apologies for the difficult formatting we are limited in file size for what we can upload.

> From: Dirk Dunning, retired professional engineer Testimony on SB 360, House Bill 2332, & House Bill 2692, and HB 2995 (Clean Energy Bill) I write today in opposition to SB 360, HB 2332, HB 2692, and in support of HB 2995 as written. SB 360, HB 2332 and HB 2692 are individually and collectively are an affront to the citizens of Oregon, and to a sane discussion of policy surrounding nuclear power. They propose to carve out a special exemption for a limited set of persons. These proposals should be soundly rejected. I have a unique perspective on the proposed actions. I am a retired Registered Professional Engineer, and formerly licensed Nuclear Power Engineer. For the last 25 years of my career I worked at the Oregon Department of Energy as senior staff doing technical analysis and policy review of nuclear matters and in the cleanup of the nuclear mess at the Hanford Nuclear Reservation in eastern Washington State, as well as for Nuclear Safety and Energy Emergency Response for the State of Oregon. I was on call 24/7 throughout my entire career in that role, principally concerned with the Columbia Generating Station and every conceivable nuclear accident at Hanford or the Columbia Generating Station. Nuclear was a field with promise 70 years ago. That time and that promise is now gone. Now with 70 years of experience we know with certainty that nuclear power has severe and fatal flaws in all of its forms. Whereas once long ago nuclear power was touted as being "too cheap to meter", we know today that nuclear cannot economically compete with power from solar, wind, hydroelectric production or natural gas from either renewable or non-renewable sources. Whereas in the beginning it was believed that the problems with nuclear waste was minor and would one day be solved, we know today that we are no closer to having a permanent geologic repository for the waste than we were then. Worse, we know today that operating nuclear power plants build in long lived radioactive wastes including highly mobile wastes and extremely difficult actinides wastes. The problems in dealing with these wastes has proven to be unsolvable. We should not create more such wastes until we have first dealt with the wastes already created. The prospects for doing that are miniscule. The public spoke firmly and clearly on this issue. SB 360, HB 2332 and HB 2692 propose to ignore and over-ride the requirements imposed by the citizens of Oregon. That is unconscionable and plainly unacceptable. The legislature should not now consider over-riding the publics policy requirement in this mater. This should only ever be changed by a vote of the people, following a very public, very open investigation of the full range of issues and be followed by a thorough vetting and debate of those issues showing how the problems have been solved (past tense). All of the involved issues were heavily debated, discussed and analyzed in the 1970s in Oregon. As part of that the Citizens of the State passed an Initiative

limiting nuclear power until such time as certain conditions were met - including the creation and operation of a licensed high-level nuclear waste repository. In the nearly half century since, we are no closer to having a high-level waste repository now than we were then. The proponents of these bills propose to wipe away the citizens considered vote on that. DO NOT DO IT. At the very least, should this ever be earnestly considered, it must be referred to the citizens of the State for a public State wide vote following a broad and deep discussion of the issues with the citizens of the State. And that should only follow the convening of a State wide public policy committee to examine, discuss and report on all aspects of the issue. This was done once before. In the 1970s, then Governor Tom McCall created an office in the Governor's Office to examine the whole range of energy issues following the oil embargo of 1973. Nuclear power was a part of that. That review resulted in a major report: ***"TRANSITION, A BOOK ON FUTURE ENERGY: NUCLEAR OR SOLAR?"***. The report was issued by the Governor's Office on January 1, 1975. Two Governors, Tom McCall and Robert Straub signed off on the recommendations made in the report, Including the never since changed policy of the State of Oregon to oppose the use of nuclear power. They concluded on page 142: "***If alternatives to nuclear fission were not available, we would likely pursue the development of this immensely hazardous source of energy. But since we have viable alternative energy sources and conservation programs, it cannot possibly be in the best interests of present and unborn populations to strike the "Faustian Bargain".***" They were correct in their analysis. History has born them out. This Office was folded into the newly created Oregon Department of Energy. The report the office issued though dated is remarkably prescient. It formed the foundational basis for the Oregon Department of Energy. Their conclusions and discussion is as, or more, applicable now as it was then. The per unit cost and reliability of wind, solar and hydroelectric power are now so good and so low that nuclear at any scale is unable to financially compete or play any meaningful role - particularly not as base load power. Reactors that can surge to meet demand impose additional requirements and costs that make them ill suited an uneconomical for that role as well. The proposed small reactors have no future place in the energy supply of the United States beyond certain military applications. Even there it was the Stated view of Admiral Hymen Rickover, the father of the US Nuclear Navy, in his retirement speech to the Congress that naval reactors should be retired from use soon as a viable alternative to them exists. The US Nuclear Navy has an astoundingly good nuclear safety record, due largely to the uncompromising Safety Culture created by Admiral Rickover. In his retirement address to the Congress, and also in part due to their not having to hew to doing everything in the least expensive way. Instead, they do it the right way - and only the right way. Admiral Rickover said in part: *"COMMENTS ON NUCLEAR POWER I think that ultimately we will need nuclear power because we are exhausting our nonrenewable resources; that is, coal and oil. I think they will go far more rapidly than we think they will and the cost is already going up. I believe that nuclear power for commercial purposes shows itself to be more economic, but that's a fake line of reasoning because we do not take into account the potential damage the release of radiation may do to future generations. I'll be philosophical. Until about two billion years ago, it was impossible to have any life on earth; that is, there was so much radiation on earth you couldn't have any life - fish or anything. Gradually, about two billion years ago, the amount of radiation on this planet and probably in the entire system reduced and made it possible for some form of life to begin, and it started in the seas, I understand from what I've read, and that amount of radiation has been gradually decreasing because all radiation has a half-life, which means ultimately there will be no radiation. Now, when we go back to using nuclear power, we are creating something which nature tried to destroy to make life possible. Now that is the philosophical aspect, whether it's nuclear power or using radiation for medical purposes or whatever. Of course, those are not bad because they don't last long, but every time you produce radiation, you produce something that has life, in some cases for billions of years, and I think there the human race is going to wreck itself, and it's far more important that we get control of this horrible force and try to eliminate it.* ***I do not believe that nuclear power is worth it if it creates radiation. Then you might ask me why do I have nuclear-powered ships? That's a necessary evil. I would sink them all.*** *I'm not proud of the part I've played in it. I did it because it was necessary for the safety of this country. That's why I'm such a great exponent of stopping this whole nonsense of war and attempt to limit war have always failed. The lesson of history is:*

When a war starts, every nation will ultimately use whatever weapon has been available. That is the lesson learned time and again. Therefore, we must expect, if another war - a serious war - breaks out, we will use nuclear energy in some form. That's due to the imperfection of human beings." http://www.worldfuturefund.org/Articles/rickover.html Yes - that is correct. The father of the Nuclear Navy opposed the continued use of nuclear power in any form. Though the Admiral was correct in his time in suggesting that commercial nuclear power might play a role, the costs, dangers and problems with nuclear have abundantly demonstrated that nuclear power no longer has any role to play at all. Nuclear reactors are not low carbon "clean" power as has often been asserted. They never have been. They do not produce "clean energy" by any measure. The entire supply chain from ore mining, through milling, separation, enrichment, and fuel fabrication uses vast amounts of carbon based fuels. The concrete and steels used in the construction of the facility likewise entail huge carbon costs. And once the plant ceases operation, the dismantlement, burial, and deep burial of the nuclear wastes produced carry enormous carbon costs. All of these are a part of the nuclear fuel cycle. Yet the nuclear industry studiously tries to pretend they do not exist, and falsely claims that nuclear is low carbon. It is nothing of the sort. The Clean Energy Bill HB 2995 should (as it does now) specifically and categorically exclude nuclear power from consideration, along with coal and other carbon intensive sources of power. Neither is nuclear power cheap. Nuclear is among the most expensive ways to generate energy. It carries huge upfront energy costs. And it entails enormous long term risks and costs. Once a plant is begun, the financial viability of the companies and government units are very much at stake, as many jurisdictions have learned to their great despair. Oregon is blessed with immense resources of Hydroelectric, Solar and Wind energy. We have no need of nuclear. Each of these is vastly less expensive than nuclear. And their costs are declining, while nuclear continues to rise. The costs arguments do not support nuclear power at any scale. The industry argues that they are needed for base load power. This is the power that cannot be turned off, and that returns the least price of any power. Nuclear cannot compete here. Wind and solar production combined approximately match the power profile of human power consumption, with increased use in the day time and decreased use at night. Hydroelectric power plays the role of the battery for storage and surge capacity in the Pacific Northwest. Nuclear does not. Nuclear wants to take the bottom off the power supply business and require that every other source provide variable power, increasing their market costs. This is wrong. With the impending cataclysmic Cascadia Subduction zone earthquake, and other lesser disasters, Oregon needs too aggressively move to distributed power production and utilization. We must not refocus our power supplies into central power stations. We should have solar power on as many roofs in Oregon as we can manage so that when disasters inevitably do strike, that most communities are able to continue with little power disruption. Centralized power, even in the guise of 'smaller' nuclear plants cannot support that. During disasters, nuclear power plants are often forced offline for safety reasons, exacerbating the power outages. The problems are much worse even than this. The nuclear power industry creates enormous uninsurable dangers. As a result, the Federal Government has limited liability in the event of nuclear disasters. That unfairly and inequitably shifts the burden to the very people harmed in a nuclear disaster. The industry suffers from excessive hubris. This has resulted in a seriously flawed safety culture that has resulted in the catastrophic destruction of the Chernobyl and Fukushima reactors, resulting in large numbers of deaths, and unimaginable risks for times longer than civilization has existed. There have been dozens of other close calls with large disasters. At Fukushima the engineers failed to understand that salt rapidly corrosively destroys steel and fuels at reactor temperatures, and that salt isn't even soluble in water under those conditions. Nevertheless they injected salt water to "cool" the reactor. Instead, the salt rained out around the fuel, heating it further and rapidly failed the primary vessel and fuel. At Chernobyl, the Chief engineer in charge over-rode safety requirements and performed a full scram of the reactor. In doing so he failed to remember or understand that the design of the reactor was compromised to increase power production in ways that made a full reactor scram extremely dangerous. As a result, the reactor arguably suffered a previously unimaginable in core low yield nuclear detonation. Each of these and dozens of similar mistakes were small decisions in a time of crisis that made the conditions vastly worse. In the US, the Nuclear Regulatory Commission engineers discovered that the control drive mechanisms at nearly all operating

nuclear plants were severely compromised with long vertical and circular cracks leaking live steam that risked the ejection of control rods and loss of control of the reactors in ways not analyzed in the safety analyses. The NRC then instituted a little noted complex wide replacement of these control drive sleeves. This problem existed for a long time before the NRC discovered it. Other welding issues resulted in a near complete through wall failure at the Davis Besse nuclear reactor due to a similar crack leak leading to severe corrosion of the reactor head. Davis Besse was spared a catastrophic failure by pure luck. At Idaho, the US Department of Energy found that the Expended Core Facility had an uncontrollable leak. As a result they conducted a little noted emergency removal of spent nuclear fuel from the basin and replacement of the basin. Though no public analysis of this event has been made; based on data from the Waste Encapsulation Storage Facility (WESF) at Hanford, it is very likely that the failure was the result of intense gamma ray exposure destroying the structural integrity of the concrete basin walls. My points here is several fold. There is an immense amount of classified knowledge that is not shared with the civilian industry. In all nuclear operations there is an over emphasis on those aspects that are known and understood and a serious lack of appreciation of those that are not. These sorts of failings are unfortunately common in the nuclear industry. Precisely how much impact this has on these proposed designs will never be known. What is known is that every major nuclear accident has as its root cause these same sorts of limitations. They lie in wait - hidden or undiscovered. This was true at Three Mile Island, Chernobyl, Fukushima, Davis Besse, Windscale, Tanks A-105 & SY-101, the K-Basins and the Waste Encapsulation Storage Facility (WESF) at Hanford, and at many many others. Nuclear has a proven track record of being an unsafe form of power production when cost has any measure of importance in the design and operation of the facility, or when safety culture is the least bit under appreciated. It is only in the highly socialized command structure of a military operation that it has been done safely. Even then, the relative safety is extremely dependent on the safety culture created around it. The Russians did far more poorly in that regard, and lost several nuclear submarines to severe nuclear accidents as a direct result. I fear that the proponents of these measures may have similar blind spots with these small reactor proposals. That these are small reactors does not assure their safety. That safety is determined by the precise design and a comprehensive and complete examination of every possible safety issue. Unfortunately, the nuclear industries track record strongly suggests that these are seldom thought through sufficiently to prevent even the worst disasters. At Hanford I personally found, highlighted and drove the issues involved in the cleanup of the K Basins, which then contained 2,350 metric tons (as uranium) of 20 year old rotting nuclear fuel about 500 feet from the Columbia River. When I pressed those issues in 1993, the DOE Manager in charge commented referring to my concerns that "*…. if that happened, it would make Chernobyl look like child's play*." His comment responding to my concern led the US Department of Energy to conduct a nation wide Spent Nuclear Fuel Working Group Report. It confirmed each and all of my concerns. It went on to detail and identify hundreds of other severe problems across the complex. That one problem at K-Basins took a decade to resolve and cost over 2 billion dollars to dry out the rotting fuel and to move it into safe dry storage. Even seemingly small problems caused by nuclear facilities are inevitably enormously costly to remedy. Even then "clean up" is a misnomer. Enormous amounts of risk and residual material nearly always remain to poison the land, air and water for time periods longer that this country has existed. At Hanford, the US Government has left an immense amount of radioactive cesium and strontium in the Waste Encapsulation Storage Facility long beyond the design life of the building. Throughout that time, DOE failed to realize the damage that the immense gamma radiation exposure caused to the basins concrete walls. The concrete is so severely damaged as to risk yet another beyond Chernobyl potential accident. I jointly drove the resolution of that problem with a DOE engineer. Due in large part to my efforts, that problem is scheduled to be resolved in the next several years with the transfer of the capsules to dry storage. There are many other similar instances. These problems though seemingly far removed from the proposed reactors - have direct application. Oregon is home to the Cascadia subduction zone. We WILL experience a massive subduction zone earthquake at some point, likely in the next 30-100 years. We are overdue. The proposed reactors will inevitably rely on concrete for their construction. In addition to causing the emission of huge amounts of carbon to the atmosphere, the concrete poses an additional risk. Concrete fails under severe

radiation exposure. And as has become painfully evident there is a tendency to forget this fact. Worse, dry concrete is affected far more severely and more rapidly than wetted concrete. Just how bad that problem is is as yet not confirmed. DOE and the industry studiously try not to gather that data. What I learned in my quarter century working on nuclear problems is just how myopic the nuclear profession can be. They see the short term benefits easily enough. But they often fail to see, assess or deal with the long term risks. And they have made excruciatingly little progress on dealing with nuclear waste. Instead, the industry has repeatedly tried to define away the problem and to abandon highly radioactive waste in poor waste forms in the near surface, or to simply not clean up the wastes at all. At the same time they have downplayed the documented risks to people and attempted to waive those away by comparing them to the now immense average annual exposure people have to radiation through medical procedures. All radiation exposure causes accumulative harm. In certain circumstances, such as medical procedures, the risks these exposures entail is justified by the potential benefit. The exposure to people without such benefits is not warranted - and certainly not without their knowing and considered permission and their direct benefit. Periodically all nuclear plants must go offline for maintenance and refueling. Generally these are planned outages. Quite often they are not. When they go offline the shutdown takes out a sizable portion of production. When this happens without warning, it creates severe problems. In that sense nuclear is unreliable. The plants often cannot be immediately restarted. Extensive outages are required before they can safely restart. Even then, the economic pressures are such that plants often run with damaged equipment. The Columbia Generating Station is an example of this. Today it is operating with a broken bracket on a main pump inside the reactor. Rather than shutdown and fix this, the operators have received permission from the NRC to inject hydrogen gas to reduce the rate of damage to the remaining bracket and to operate under those conditions. This greatly increases the risks of a catastrophic failure, and greatly increasing the severity of the resulting accident. The spent fuel pools at every reactor store an immense amount of highly radioactive fuel in a tight pack storage condition which maximizes radiation exposure to the concrete in the basins - ignoring the lessons from WESF and the Expended Core Facility in Idaho about the grave dangers that poses. Even today the nuclear industry tries very hard to ignore this major problem. All of the spent fuel pools at every nuclear facility need to be urgently emptied into dry storage. New temporary pools are needed that greatly decrease the dose exposure to the concrete in the pools. Extensive detailed studies of how ‘dry’ concrete reacts to gamma ray exposure are urgently needed. The very limited data that does exist suggests that the risk is about a thousand times higher for damage to dry concrete than to wet concrete. Yet there are very few data points to assess that risk. This gravely increases the risk of a basin failure and the consequent release of radioactive materials. The legislature should reject these proposals as being unwarranted risks to the citizens of Oregon, and a violation of the trust of the citizens of Oregon and faith in the policy choice the citizens made via Initiative. Nuclear has no place in the energy makeup of our future.