LIFECYCLE REPORT 2014

The following is a notional response to the reading of the 2014 Hanford Lifecycle Report (LCR) prepared by the Department of Energy and published January 29, 2014.

The LCR is a public document that describes the aspects, assumptions, and costs associated with the Hanford clean-up project as it is projected into the year 2060 and beyond. The report is directed to the public and outlines the Hanford project and explains how the project will be accomplished in non-technical language. As an informed (but not expert) reader, a number of questions were posed while reviewing the document. The following notes show the page number of the document, with the original notation underlined. Additional comments may follow these underlined portions.

As a notional document, this feedback represents a "mind map" of what caught my interest and the questions that arose in the reading. In the latter portion, specific documents are cited to assist me to find additional information on topics of interest.

I apologize for the length. I found the report fascinating and well worth the time. I read the entire text. There's a lot to know.

SECTION 2.0	HANFORD LIFECYCLE SUMMARY
Pg 2.7	Groundwater/Vadose Zone PBS RL-0030
SECTION 3.0	RIVER CORRIDOR CLEANUP
Pg 3.1	ISS – interim safe storage 8 reactors
Pg 3.2	ISS C Reactor
	What are the characteristics of the reactor blocks? Are the reactors safe from aerial attack when stored on the ground?

Pg 3.3	"enhanced attenuation of uranium using sequestration in the vadose zone…"
Pg 3.3	UBS usage-based services
Pg 3.5	How is this defined?
Pg 3.4	Where is ERDF? What is the "successor operator"? Clean-up criteria – what is an acceptable level of contamination? "Preparing transition & turnover packages for the six geographic areas for transition to Hanford long-term stewardship" What are the 6 geographic areas? Local or national?
Pg 3.4	Washington Closure Hanford— "performance and incentive fee" Is the incentive fee awarded when the performance is under budget/on time?
Pg 3.4	B Reactor – national historic monument Is the budget from Dept of Interior or National Park Service?
Pg 3.5	Site-wide services See 6.3.2 for description
Pg 3.8	Canister storage building—Interim storage (dry?) (wet?) Cold vacuum drying facility T plant interim storage WIPP waste isolation pilot plant
Pg 3.8	K Basins O&M (operations and maintenance
Pg 3.12	N reactor not included with other reactors in 1993—separate NEPA or CERCLA process
Pg 3.14	T plant is acceptable for interim storage & no pretreatment of the Sludge is needed before transfer (assumption)
SECTION 4.0	CENTRAL PLATEAU CLEANUP
Pg 4.1	Central plateau—5 massive chemical processing facilities called canyons 450 billion gallons liquid waste discharged onto the ground
Pg 4.2	Deep vadose zone
Pg 4.3	Plutonium Finishing Plant PFP high priority (D4) completed in 2009

	Plutonium holdup material (i.e. in ducting)
	Slab-on-grade –concrete slab (1st floor)—free of dispersible radiological contamination
Pg 4.7	Reached Columbia River: tritium from Central Plateau; chromium, strontium-90, uranium from 100 & 300 Areas
Pg 4.7	Groundwater contamination of chemicals are catalogued
	3 objectives listed that may be hard to realize in regards to radionuclides
	10 groundwater OU's (define): 6 in River Corridor, 4 in Central Plateau
	Atomic Energy Act, CERCLA, RCRA, Wash St Waste Act
	100BC-5 & 100KR-4 High cost projects
	100-NR-2; 100-HR-3; 100FR-3; 200BP-5; 200-PO-1; 200-UP-1; 200-ZP-1; 200PW-1; 300-FF-5; (200-DV-1 has been added)
Pg 4.9	Groundwater assessment – "fate & transport evaluations for contaminant migration" Planning to move contaminants? Where?
	Groundwater decision documents These documents would likely answer the previous questions and are cited in the appendices.
Pg 4.10	Deep Vadose Zone treatability tests
	Deep Vadose Zone OU – adding 200-DV-1 (high cost)
	Project team to develop & evaluate DVZ remedies
Pg 4.13	Central Plateau Remediation Project (PBS RL-0040)
	Demolition & remediation 27 geographical areas Map?
	Referred to as closure zones – above ground & pipes & waste sites
	Project "begins" upon completion of Groundwater/Vadoze Zone (PBS RL-0030)
	"Legacy wastes & facilities at PNNL dispositioned" What does this mean? Are the legacy wastes and facilities at the national laboratory outside the scope of the DOE cleanup? What is

	"dispositioning"? Is the cleanup going to be shared/reallocated to partner industries in the private sector?
Pg 4.14	"Regulatory decision for below-slab remediation of non-canyon facilities…tasks necessary to address aging facilities or waste site conditions that are above & beyond anticipated operational & maintenance plans." Could there be substantial undocumented below-ground waste in these areas?
Pg 4.16	Zone environmental remediation High cost
Pg 4.17	FFTF – removing sodium coolant & clean residual sodium
Pg 4.18	FFTF is currently in a surveillance & maintenance mode "Eventually, the sodium will be processed & final disposition will commence." No ROD for this portion
Pg 4.19	FFTF costs estimated to increase 2023 Is this when final disposition is expected to commence?
Pg 4.22	Catalogue of the various types of waste products
Pg 4.23	Where is WIPP? What is CCP—Central Characterization Project? RH – remote handled TRU; CH – contact handled TRU SNF – construction of Fuel Preparation Facility Is this for plutonium, HEU, MOX processing? How is the fuel prepared?
Pg 4.26	Sludge disposition – high cost until 2020 TRU retrieval high cost until 2020 & TRU repackaging
Pg 4.27	"Industrial worker" standard to define exposure scenarios Is this the work of industrial hygienists? What is an example of an ABAR? Transuranic waste treated by T plant per TPA milestone M-091-01 Shipping transuranic waste until FY 2030 Where?
SECTION 5.0	TANK WASTE CLEANUP
Pg 5.1	WTP—vitrification PBS-0060 Mixed tank waste PBS ORP-0014 RPP is comprised of tank farms

WTP systems comprised of 200 interrelated facilities

RPP baselines & change requests ORP-11242 reported in LCR as they are implemented

Tank farms 86 in 200 West; 91 in 200 East = 177 tanks

Smallest SST hold about 55K gallons

Largest DST hold about 1.5 million gallons (ratio of capacities a factor of about 9)

149 SST & 28 DST containing a total of 53 million gallons waste (pg 5.5)

Pg 5.2 Diagram of WTP and future construction: low activity waste processing; shipping facility; offsite geologic repository

What is pre-treatment evaporation? What is offgas?

Pg 5.3 Tank waste from separation facilities through underground lines

Solids settled in tanks: 1)"sludge"; 2) clarified radioactive liquid termed supernatant or supernate

Supernate decanted & evaporated. Products are 1) steam condensate; 2) waste slurry – returned to tanks when cooled – saltcake

Tank storage at high temp due to fission—solid mass forms at bottom of tank called hard heels

Tank waste strategy: Move SST to (existing?)DST then to WTP

WTP will safely treat entire HLW fraction (fuel rods? MOX?)

1/3 LAW immobilized in vitrification facility (other 2/3?)

How is 2/3 different from 1/3?—requiring new innovations for treatment

Waste feed preparation to mitigate sodium mgmt issues (saltcake vs molten sodium in FFTF)—what are the chemical properties of sodium and silica in reference to vitrification?

Developing packaging capability so CH waste onsite storage

Deploying interim storage for vitrified (immobilized) waste (LTS at national repository – where? – transportation?)

Pg 5.5	Fig 5-3 contains nice paragraph describing ORP
Pg 5.6	Pending decision re (2/3 waste) DOE/EIS-0391 (environmental impact statement Table 5.1 refers to "hot commissioning" What does that mean? Is this a reactor process?
Pg 5.8	Fig 5-6 shows early cost spike for "supplemental treatment" What treatment does this refer to?
Pg 5.9	Nice paragraph describing LAW using term "Joule heating" Is this a reactor process? Pretreatment – how are LAW & HAW separated?
Pg 5.10	Scenarios reviewed against EIS 0391(NEPA process compared against EIS) How are the scenarios evaluated as successful? Cesium & strontium capsules not processed by WTP (see ROD 78 FR 75913) – not DOE Offsite repository (national repository) delays a "key uncertainty" – onsite storage of up to 2K canisters, could be expanded to 16K canisters – not included in cost figures
Pg 5.13	2nd LAW vitrification plant planned adjacent Integrated disposal facility (IDF) currently in standby mode – IDF can be expanded to support mission Is this a reactor process? Funding included for risk mitigating actions
SECTION 6.0	MISSION SUPPORT
Pg 6.1	Safeguards & security on Appendix C-11 (pg C-21 $ x $1000)
Pg 6.3	S&S costs per year – spikes 2019, drops in 2038 Why?
Pg 6.4	HAB budget in RL-0100 (& WA Ecology) budget on C-28 (x $1000) 16,892 in 2014; 37,410 in 2015 Why? Increases to 50,000 in 2016
Pg 6.6	Cost increases for addition of reliability projects & (UBS, G&A, direct distribution) Why moved into this budget? Where was it before?

Pg 6.7	RL directed activities, including legal services and allocated pensions
Pg 6.8	FY 2040 big one-year drop Why?
Pg 6.10	DOE Office of Legacy Management LM PBS RL-LTS Section 6.4 LTM DOE/RL-2010-35 specifies PBS RL-0040 PBS refers to LM activities at Hanford
Pg 6.11	LTS at Hanford predicted for 2060-2090—DOE presence beyond 2090, especially at Central Plateau
Pg 6.12, 13	Gap in waste management budget 2080-2087 Why? Figure 6-10 shows a drop in budget on 2080—is that when FFTF is planned for decommissioning?

SECTION 7.0	REPORT LIMITATIONS
7.1	Washington state leases land to US Ecology Inc for the burial of commercial low level radioactive waste Facilities not covered under DOE

Jan Catrell
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