

July 14, 2009

**DRC BOARD WORK
MEETING SESSION
AT 2:30 P.M.**

AND

**DRC BOARD MEETING
AT 3:00 P.M.**

**Department of Environmental Quality
168 N 1950 W, DEQ BLDG #2
CONFERENCE ROOM 101
Salt Lake City, Utah 84114-4850**

RADIATION CONTROL BOARD
Department of Environmental Quality (Bldg #2),
Conference Room 101, 168 North 1950 West, Salt Lake City, Utah
July 14, 2009

FINAL AGENDA

Work Meeting

2:30 p.m. to 3:00 p.m.

Technical aspects of Depleted Uranium disposal

Regularly Scheduled Board Meeting

3:00 p.m. to 5:00 p.m.

- I. Minutes (**Board Action Item**)
 - a. Approval of the Minutes from the June 9, 2009 Board Meeting

- II. Rules
No Items

- III. Radioactive Materials Licensing/Inspection
No Items

- IV. X-Ray Registration/Inspection
No Items

- V. Radioactive Waste
 - a. Presentation by Laura Lockhart: Utah Code Annotated § 19-3-104(8) "No More Stringent" Rule (**Board Information Item**)
 - b. Presentations by HEAL-Utah, and EnergySolutions, LLC "Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste" (**Board Action Item**)
 - c. Requests to Board to Provide Comments on Depleted Uranium Disposal (**Board Information Item**)
 1. Stephen T. Nelson, Ph.D.
 2. Brian Moench, M.D.

- VI. Uranium Mill Licensing and Inspection
No Items

- VII. Other Division Issues (**Board Information Item**)
 - a. Division Activities Report

- VIII. Public Comment

- IX. **The Next Scheduled Board Meeting: August 11, 2009 (Tuesday)**, DEQ Bldg #2, Conference Room 101, 168 North 1950 West, Salt Lake City, Utah 3:00 – 5:00 P.M.

DRC WORKING MEETING SESSION
DEQ Building #2
168 N 1950 W
Conf. Room 101
Salt Lake City UT 84114-4850
2:30 p.m. – 3:00 p.m.

UTAH RADIATION CONTROL BOARD
WORKING MEETING SESSION
ATTENDANCE
DATE: Tuesday, July 14, 2009

DRC Board Members Attending Working Session Meeting at 2:30 p.m.:

- (1) Peter A. Jenkins, M.S., CHP, Chair - Yes
- (2) Elizabeth Goryunova, M.S., Vice Chair - Yes
- (3) Scott Bird - Yes
- (4) Patrick D. Cone – Yes
- (5) Frank D. DeRosso, MSPH, CIH - Yes
- (6) Christian K. Gardner - Yes
- (7) Colleen Johnson - Yes
- (8) Edd C. Johnson – Yes
- (9) Amanda Smith, DEQ Executive Director - Yes
- (10) John W. Thomson, M.D. Yes
- (11) David A. Tripp, Ph.D. - Yes

DRC Board Members Not Attending Working Meeting at 2:30 p.m.:

- (12) Joseph K. Miner, M.D.,
- (13) Douglas S. Kimball, DDS

DRC Executive Secretary Attending Working Meeting 2:30 p.m.:

- (14) Dane L. Finerfrock, Executive Secretary – Yes

DRC Board Working Meeting Session Adjourned at 3:07 p.m.

DRC Board Members Attending Board Meeting at 3:00 p.m.:

- (1) Peter A. Jenkins, M.S., CHP, Chair - Yes
- (2) Elizabeth Goryunova, M.S., Vice Chair - Yes
- (3) Scott Bird - Yes
- (4) Patrick D. Cone – Yes
- (5) Frank D. DeRosso, MSPH, CIH - Yes
- (6) Christian K. Gardner
- (7) Colleen Johnson, Commissioner – Yes
- (8) Edd C. Johnson – Yes
- (9) Joseph K. Miner, M.D., MSPH - Yes
- (10) Amanda Smith, DEQ Executive Director - Yes
- (11) John W. Thomson, M.D. Yes
- (12) David A. Tripp, Ph.D. - Yes

DRC Board Members Not Attending Board Meeting at 3:00 p.m.:

- (13) Douglas S. Kimball, DDS

DRC Executive Secretary Attending Board Meeting:

- (14) Dane L. Finerfrock, Executive Secretary – Yes

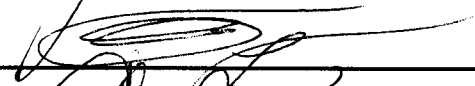
DRC Board Meeting Adjourned at 6:00 p.m.

UTAH RADIATION BOARD

BOARD MEMBERS - SIGN-IN SHEET

MEETING DATE: July 14, 2009

Peter A. Jenkins, M.S., CHP, Chair 

Elizabeth Goryunova, M.S., Vice Chair 

Amanda Smith, DEQ Executive Director 

Dane L. Finerfrock, Exec. Sec. 

Scott Bird 

Patrick D. Cone 

Frank D. DeRosso, MSPH, CIH 

Christian K. Gardner 

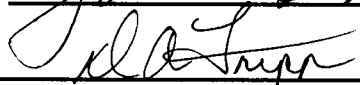
Colleen Johnson 

Edd C. Johnson 

Douglas S. Kimball, DMD absent apr 11/14/09

Joseph K. Miner, M.D., MSPH 

John W. Thomson, M.D. 

David A. Tripp, PH.D. 

OTHER STAFF ATTENDING

Public Attendance Sheet
Utah Radiation Control
Board Meeting
 DEQ Bldg. #2, Conf. Room 101
 168 N 1950 W, Salt Lake City, UT 84114-4850
 3:00 - 5:00 p.m.
 July 14, 2009
Please Print

NAME (Please Print)	Organization/Affiliation Phone Number and Email Address:	Speak: Yes or No? If Yes, which Agenda Item Do you Wish to Address Before the Board Today? (List Item#)
1. Amy Crenshaw	Desert News	no
2. Dan Shou	Energy Solutions	
3. Mark Ledoux	Energy Solutions	No
4. THOMAS MAGETTE	ENERGY SOLUTIONS	
5. Janet Schramke	Enchemica LLC	No
6. James O'Neal	private citizen, Provo	yes - #V
7. Kate Savage	concerned citizen	no
8. Vinessa Purcell	HEAL Utah	NO
9. Sophia Nicholas	HEAL Utah	NO
10. Tim Fine	Heal Utah	NO
11. Cherry Wong	Women Concerned	NO
12. Bob Hendrix	WRE/CITIZEN	
13. Christopher Thomas	HEAL UT	
14. Eric Spreng	HEAL UT	No
15. KRISTA BOWERS	concerned citizen	No
16. Mary Rogers	concerned citizen	No
17.		
18.		
19.		

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NAME (Please Print)	Organization/Affiliation: Phone Number and Email Address:	Speak: Yes or No? If Yes, which Agenda Item Do you Wish to Address Before the Board Today? (List Item#)
20. JEFF CLAY	Citizen	No
21. Cris Cowley	UPHE	Yes
22. Ann Jepsen	Citizen	No
23. Lew Jepsen	Citizen	No
24. Mike Cowley	Citizen	Yes
25. Candice Fitches	student	No
26. ARTHUR MORRIS	HEAR	NO
27.		
28.		
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		

DIVISION OF RADIATION CONTROL
BOARD

VOTING POLL

DRC Board Mtg Date: July 14, 2009
 DRC Board Members Present: 12
 DRC Board Members Absent: 1
 Total DRC Board Members: 13

13 Board Voting Members
 13- Total DRC Board Members

Action Item on Agenda:

Item V. Radioactive Waste

- b. Presentations by ~~HEAL~~ - Utah, and EnergySolutions, LLC "Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste" (Board Action Item)

*Motion to table until 9/22/09
w/ presentation by NRC*

Name of Board Member

	Listed in Seating Order: (Your Right to Left)	Attending Mtg/ Yes or NO	Vote: Yeah/ Yes	Vote: Neah/ No	MOTION PASSED	MOTION DID NOT PASS
1	Christian K. Gardner		X			
2	Scott Bird		X			
3	Frank D. DeRosso, MSPH, CIH			X		
4	John W. Thomson, M.D.			X		
5	Amanda Smith, DEQ Exec. Director		X			
14	Dane L. Finerfrock, Exec. Sec.	N/A	N/A	N/A	N/A	N/A
6	Peter A. Jenkins, M.S. CHP, DRC Chair		ABSTAIN			
7	Elizabeth Goryunova, M.S. DRC Vice Chair		X			
8	Joseph K. Miner, M.D., MSPH			X		
9	Colleen Johnson					
13	Douglas S. Kimball, DMD	Absent	N/A	N/A	N/A	N/A
10	Edd C. Johnson		X			
11	David A. Tripp, Ph.D.		X			
12	Patrick D. Cone			X		
	Total DRC Board Members					
	Total Voting - Yeah/Yes					
	Total Voting - Neah/No					
	Total DRC Board Member's Abstention on This Vote					
	Vote Passed - Approved, Yes					
	Vote Did Not Pass - No					

- V. **Radioactive Waste**
 - b. **Presentations by HEAL-Utah, and EnergySolutions, LLC “Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste”
(Board Action Item)**

**Presentation by: Dane L. Finerfrock,
Executive Secretary**



DEPLETED URANIUM DISPOSAL

Radiation Control Board Meeting
July 14, 2009

1



3 Important Definitions:

1. Radioactivity: Some atoms are unstable and undergo a spontaneous decay process, emitting one or more types of radiation until stability is reached.
2. Curie: The rate of decay is called activity, which is the number of disintegrations per second, 1 curie is equal to 3.7×10^{10} d/sec or .37 billion

2

3 Important Definitions:

3. Half-Life: The period of time it takes for $\frac{1}{2}$ of the unstable atoms to transform to other unstable atoms or to a stable atom.

Ex: Carbon-14 \rightarrow Nitrogen-14 (Stable)

Half-life= 5703 yrs

Americium-241 \rightarrow Neptunium-237

Half-life=433 yrs (Radioactive)

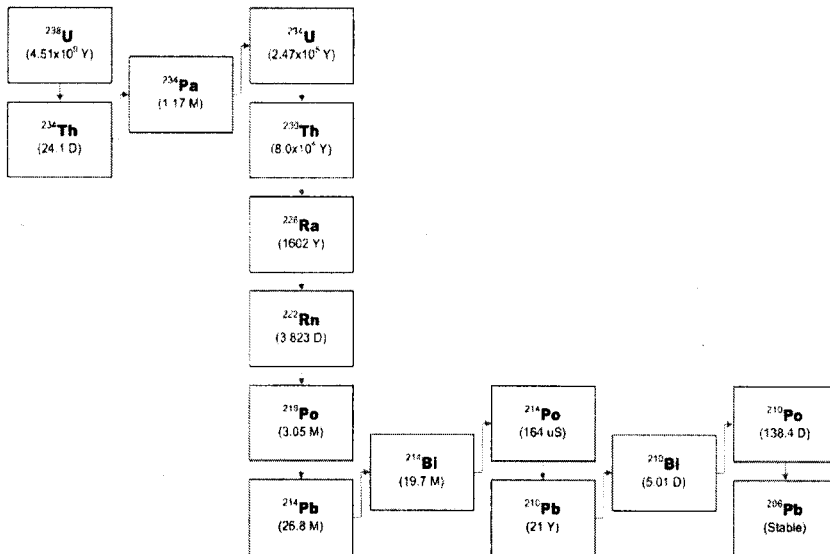
3

What is Depleted Uranium?

Natural Uranium	U-238	99.276%
Isotopes	U-235	0.7196%
	U-234	0.0057%
Depleted Uranium	U-238	99.8%
Isotopes	U-235	0.2%
	U-234	0.001%

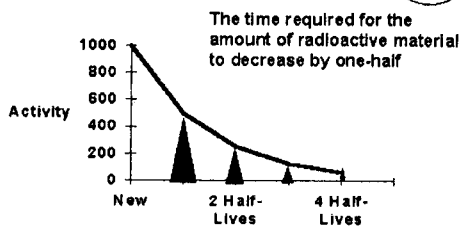
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URANIUM DECAY SERIES

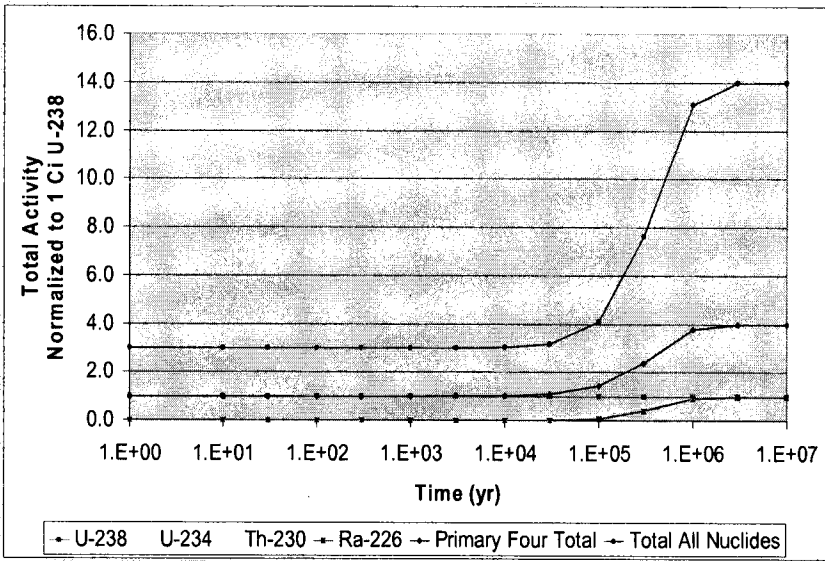


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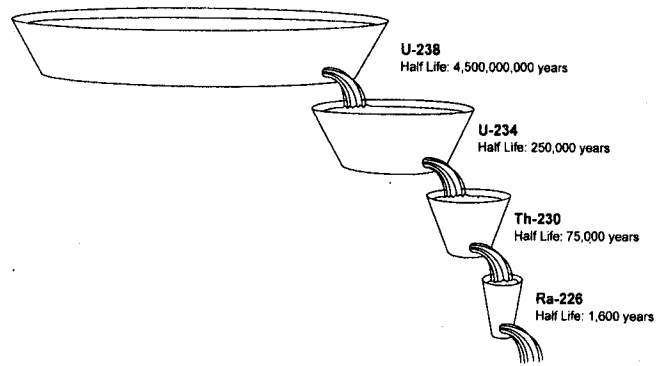
Half-Life



6



7



Differences: DU vs. Natural Uranium

- DU has approximately 3 times less U-235 and U-234
- Consequently, the radiation doses from DU are approximately 60% less than U-Natural
- Behavior of DU in the body is the same as natural uranium

World Health Org. /factsheet no 257, Revised 1/2003

9

DU Disposed @ EnergySolutions

- Approximately 48, 000 tons of DU has been disposed in 6.53 million cubic yards of LLRW waste. In the majority of the cases, the DU is very diffuse and concentrations are low in the waste matrix.
- Future DU disposal may include large volumes of DU that are not diffuse, a concentrated mass of uranium-238 oxide.

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Regulatory Approach to LLRW Disposal

Site Selection – Natural conditions are conducive to long term isolation

Geologic Hydrologic
Seismic Remote Location
Climate
Lack of Mineral resources

11

Regulatory Approach to LLRW Disposal

Engineered Disposal Barriers –
Natural Materials in Construction of
Cover Systems and Liners

EX: Rock Armor


Erosion

Biointrusion

Human Intrusion

Clay Liner

12




Regulatory Approach to LLRW Disposal

Administrative Controls

1. Restrictive Covenants on Land title
2. Zoning Restrictions-Tooele County
3. Record Keeping-State and Tooele County

13



Regulatory Approach to LLRW Disposal

Perpetual Care Fund

Funding to correct future issues

14

WHY

- To Prevent Contact with Disposed Waste
- To Prevent Release to the Environment. Maintain Isolation.

Question ?
Compliance Over What Time
Period?

15

What is Performance Assessment

An **iterative** process, involving a site-specific, prospective modeling evaluation of the post-closure time period to determine:

- Whether reasonable assurance of compliance and quantitative performance objectives can be met, and

16



What is Performance Assessment

To identify critical data, facility design elements and model development needed for determining waste disposal site operating limits and providing defensible and cost effective licensing decision.


17



What is Performance Assessment

In plain terms, performance evaluations provide, significantly but not exclusively, the technical basis for the design, operation and closure of the low-level radioactive waste disposal facility during the license review process.

18




Components of Assessment Modeling

Source Term – The radiologic, biologic, chemical and physical characteristics of proposed waste. (Existing performance evaluations for U-238 assume a maximum possible activity of uranium and decay products.)

Facility Design – Cover System and infiltration, bottom liners, seismic stability, closure requirements and overall engineering design features.

19



Pathways Analysis – An evaluation of potential exposures including: food chain, including surface water resources, inadvertent chronic or acute human exposure, atmospheric transport and biotic transport and many, many others.

Ground Water Flow and Transport (A critical pathway for the Clive Site)

Evaluation of Uncertainty and Sensitivity - Model inputs and assumptions are subject to alternative approaches and scenarios.

Example: Site semi-arid or inundated

20



Possible Impacts of the Nuclear Regulatory Commission Rulemaking

- Two new considerations for an updated performance evaluation for the Energy *Solutions* disposal facility.
 - ✦ Disposal of diffuse depleted uranium versus disposal of large mass quantities, and
 - ✦ Time period for demonstrating compliance with performance objectives and rules.

21



Possible Impacts of the Nuclear Regulatory Commission Rulemaking

- A revised performance evaluation must consider the entire waste disposal site inventory of radionuclide including all sources of uranium, radium and other radioisotopes of concern for the performance time period.

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V. Radioactive Waste

- b. Presentations by HEAL-Utah, and EnergySolutions, LLC “Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste” (Board Action Item)**

**Presentation by HEAL – Utah
Additional Information:**

**RE: Board Questions Related to
Potential DU Moratorium**

ADVISORY COUNCIL

Dr. Lou Borgenicht
 Dr. Jane Bowman
 Margene Bullock
 Mary Dickson
 Ed Firmage
 Claire Geddes
 Boyer Jarvis
 Lisa Kirk Colburn
 Dr. Jerry Lazar
 Jim McConkie, esq
 Dee Rowland
 Dr. Kent Staheli
 Barbara & Norman Tanner
 Kathy VanDane
 Chip Ward
 Terry Tempest Williams

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 Jill Sheinberg

www.healutah.org



68 S. Main St, Suite 400 Salt Lake City, Utah 84101 (801) 355-5055

TO: Radiation Control Board members

RE: Board questions related to potential DU moratorium

1. Do you anticipate the NRC rule-making process to result in significant changes to the DU acceptance and performance criteria for the EnergySolutions site? Explain how anticipated changes may/ may not affect health and safety concerns.

Yes. We expect that the NRC rule-making process could result in dramatic changes to the way EnergySolutions is required to analyze the health and safety impacts of DU disposal and the results of those analyses.

For instance, EnergySolutions' recent modeling (Whetstone 2000) only assumes a performance period of 500 years and only evaluates impacts to people who reside off-site. These assumptions support a conclusion that the entire site could be safely filled with DU.

The NRC analysis looks at a performance period that more closely approximates the hazard life of DU— 1 million years. The NRC also specifically evaluates an on-site intruder scenario. As a result, the NRC analysis concludes that the ability of a given site to meet safety standards is strongly site-specific and highly sensitive to the period of performance modeled.

For example, at an arid site and assuming a disposal depth of 5 meters, the off-site resident scenario met the applicable dose limits in 100% of the site conditions modeled at 1,000 years. However, if you extend the performance period to *1 million years*, only 30% of the site conditions modeled met the safety standards (NRC 2008 p.18). In general, longer performance periods result in fewer sites that are protective of the public.

Similarly, modeling an on-site vs. an off-site exposure pathway can also lead to dramatic differences in the results. For example, at 3 meters of disposal depth at an arid site at 1,000 years, the off-site resident meets safety standards in 100% of cases. However, the on-site chronic intruder only meets safety standards in 2% of cases for all those same conditions.

Because the results so strongly depend on the performance period and the off-site vs. on-site exposure scenario, we believe that new standards requiring a long performance period and/or an on-site exposure scenario could alter the ability of the EnergySolutions Clive site to meet safety standards.

Engaging Citizens in the Effort to Protect Public Health from Nuclear and Toxic Waste

Interestingly, the NRC 2008 analysis did not model erosion. Rather, the disposal depths were held constant at 1, 3, and 5 meters. Furthermore, the NRC 2008 analysis assumed that the site was entirely underground and therefore did not take into account potential long-term changes in site stability. Any modeling at the EnergySolutions site should take into account the effects of erosion and site stability on the ability of the site to meet safety standards.

2. Would the acceptance, under the current regulatory framework, of large quantity DU waste between now and the time the NRC issues its ruling pose a health and safety risk to the people and environment of Utah? If so, how? If not, why not?

Yes. EnergySolutions says that the amount of DU available for disposal in the next 5 years is 46,000 metric tons. This amount far exceeds the amount of DU that the NRC considers safe for disposal at shallow depths, which is 1–10 metric tons (NRC 2008 p.16). Therefore, we believe that the 46,000 metric tons available for disposal therefore qualifies as a “significant amount” of DU that would require appropriate site-specific modeling that would take into account DU’s long (1 million year+) hazard life, impacts to on-site intruders, and potential geological changes that could occur over the life of the hazard.

Over the long-term, if erosion or other processes uncover this amount of waste, we believe an on-site intruder could receive a larger radiation dose than Utah rules allow, by a significant margin. In fact, an analysis that accounted for the long-term hazard of DU and erosion found that an intruder could receive more than the allowable radiation dose in *merely a matter of hours* before the 100,000 year mark (see Makhijani and Smith 2005, p.16¹)

3. How would the implementation of a temporary moratorium affect the answers given above?

A temporary moratorium would allow for a robust rule-making process to be conducted by the NRC. As has been noted by EnergySolutions, the NRC is conducting a series of panels, one of which will be held in Salt Lake City in September. The purpose of these panels is to gather stakeholder input about what kinds of rules should govern the technical analyses that model the hazard of DU—for example, should an on-site intruder scenario be required of all sites? Should geologic phenomena such as the periodic filling of the Lake Bonneville basin be accounted for? HEAL Utah plans to participate in the September panel and in the rule-making process more broadly, and we would encourage representatives from the Radiation Control Board to participate as well.

Once the technical requirements and the rule itself have been finalized, the moratorium would allow the state of Utah 180 days to decide whether the new Federal rule and technical requirements are adequate to protect the health and safety and environment of Utah over the life of the hazard posed by large quantities of DU. At that time, the Board could either implement a lasting ban on DU or allow the moratorium to sunset without further action.

We believe that if the NRC requires modeling over the time of hazard posed by DU and impacts to on-site intruders (with the effects of erosion and geologic processes accounted for), the EnergySolutions Clive site may be found unsuitable for DU disposal. This would ensure protection of the Utah public in conformance with Utah’s radiation control rules—specifically: protection of the public from doses greater than 25 mrem per year (R313-25-19), protection of inadvertent intruders (R313-25-20), and avoidance of areas where

¹ <http://www.ieer.org/reports/du/LESrptupdate.pdf>

surface geologic processes could lead to failure of performance objectives or lead to indefensible modeling (R313 -25-23).

4. Can the same results be accomplished by means other than a moratorium?

No. In general, we do not believe that the EnergySolutions site— being an engineered, rather than a geologic, disposal site— is appropriate for any material that poses such a large hazard over a geologic timeframe. We believe that if the NRC rulemaking process results in a common-sense approach to required modeling of DU's health impacts, the EnergySolutions Clive site could and should be found inappropriate for disposal of large quantities of DU.

Even requiring a disposal depth of 3 meters, as EnergySolutions has suggested, would likely be inappropriate to protect intruders onto the site. For example, the NRC analysis found that such disposal at an arid site would exceed dose limits in 98% of site conditions modeled, even at 1,000 years, the shortest timeframe modeled (NRC 2008 p.18).

Requiring deeper disposal still wouldn't necessarily remedy the problem. Erosive forces acting over the long time periods during which the hazard from DU will last could eventually uncover the waste, exposing DU's decay-chain products (radon gas and radium, primarily) to the surface and to inadvertent intruders. Therefore, no amount of disposal depth may be sufficient to ensure health and safety standards are met over the long timeframe of hazard.

Having said that, if EnergySolutions or anyone else produced defensible modeling that took into account a performance period that matched the period of hazard, a realistic on-site intruder scenario, and the gamut of erosive forces that would act on the site over the period of performance, we would be open to those results.

We believe that EnergySolutions' modeling on DU has been inadequate and hope that the NRC rulemaking will require modeling that more accurately measures risks to the public. In the interim, we strongly believe a moratorium will protect public health and safety from the quantities of DU that could arrive here before the rulemaking is complete.

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Requiring deeper disposal still wouldn't necessarily remedy the problem. Erosive forces acting over the long time periods during which the hazard from DU will last could eventually uncover the waste, exposing DU's decay-chain products (radon gas and radium, primarily) to the surface and to inadvertent intruders. Therefore, no amount of disposal depth may be sufficient to ensure health and safety standards are met over the long timeframe of hazard.

Having said that, if EnergySolutions or anyone else produced defensible modeling that took into account a performance period that matched the period of hazard, a realistic on-site intruder scenario, and the gamut of erosive forces that would act on the site over the period of performance, we would be open to those results.

We believe that EnergySolutions' modeling on DU has been inadequate and hope that the NRC rulemaking will require modeling that more accurately measures risks to the public. In the interim, we strongly believe a moratorium will protect public health and safety from the quantities of DU that could arrive here before the rulemaking is complete.

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68 S. Main St, Suite 400 Salt Lake City, Utah 84101 (801) 355-5055

TO: Radiation Control Board members

RE: Board questions related to potential DU moratorium

1. Do you anticipate the NRC rule-making process to result in significant changes to the DU acceptance and performance criteria for the EnergySolutions site? Explain how anticipated changes may/ may not affect health and safety concerns.

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For instance, EnergySolutions' recent modeling (Whetstone 2000) only assumes a performance period of 500 years and only evaluates impacts to people who reside off-site. These assumptions support a conclusion that the entire site could be safely filled with DU.

The NRC analysis looks at a performance period that more closely approximates the hazard life of DU— 1 million years. The NRC also specifically evaluates an on-site intruder scenario. As a result, the NRC analysis concludes that the ability of a given site to meet safety standards is strongly site-specific and highly sensitive to the period of performance modeled.

For example, at an arid site and assuming a disposal depth of 5 meters, the off-site resident scenario met the applicable dose limits in 100% of the site conditions modeled at 1,000 years. However, if you extend the performance period to *1 million years*, only 30% of the site conditions modeled met the safety standards (NRC 2008 p.18). In general, longer performance periods result in fewer sites that are protective of the public.

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Because the results so strongly depend on the performance period and the off-site vs. on-site exposure scenario, we believe that new standards requiring a long performance period and/or an on-site exposure scenario could alter the ability of the EnergySolutions Clive site to meet safety standards.

Engaging Citizens in the Effort to Protect Public Health from Nuclear and Toxic Waste

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2. Would the acceptance, under the current regulatory framework, of large quantity DU waste between now and the time the NRC issues its ruling pose a health and safety risk to the people and environment of Utah? If so, how? If not, why not?

Yes. EnergySolutions says that the amount of DU available for disposal in the next 5 years is 46,000 metric tons. This amount far exceeds the amount of DU that the NRC considers safe for disposal at shallow depths, which is 1–10 metric tons (NRC 2008 p.16). Therefore, we believe that the 46,000 metric tons available for disposal therefore qualifies as a “significant amount” of DU that would require appropriate site-specific modeling that would take into account DU’s long (1 million year+) hazard life, impacts to on-site intruders, and potential geological changes that could occur over the life of the hazard.

Over the long-term, if erosion or other processes uncover this amount of waste, we believe an on-site intruder could receive a larger radiation dose than Utah rules allow, by a significant margin. In fact, an analysis that accounted for the long-term hazard of DU and erosion found that an intruder could receive more than the allowable radiation dose in *merely a matter of hours* before the 100,000 year mark (see Makhijani and Smith 2005, p.16¹)

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Once the technical requirements and the rule itself have been finalized, the moratorium would allow the state of Utah 180 days to decide whether the new Federal rule and technical requirements are adequate to protect the health and safety and environment of Utah over the life of the hazard posed by large quantities of DU. At that time, the Board could either implement a lasting ban on DU or allow the moratorium to sunset without further action.

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DIVISION OF RADIATION CONTROL

BOARD MEETING

July 14, 2009

**ADDITIONAL
SUPPLEMENTS**

DRC BOARD FILE

I. Minutes (Board Action Item)

- a. Approval of the Minutes from the June 9,
2009 Board Meeting**

**Replace Page 1
Correction Made to Align List of
Board Members Names
Starting with:
Patrick D. Cone
Colleen Johnson
Edd C. Johnson**

MINUTES
OF
THE UTAH RADIATION CONTROL BOARD

June 9, 2009

Department of Environmental Quality, DEQ Building #2

Conference Room 101

168 N 1950 W

Salt Lake City, Utah 84114-4850

BOARD MEMBERS PRESENT

Peter A. Jenkins, M.S., CHP, Chair
Elizabeth Goryunova, M.S., Vice Chair
Dane L. Finerfrock, Executive Secretary
Scott Bird
Patrick D. Cone
Colleen Johnson
Edd C. Johnson
Douglas S. Kimball, DMD
Amanda Smith, DEQ Executive Director
John W. Thomson, M.D.
David A. Tripp, Ph.D.

BOARD MEMBERS ABSENT/EXCUSED

Frank D. DeRosso, MSPH, CIH
Christian K. Gardner
Joseph K. Miner, M.D., MSPH

DRC STAFF/OTHER DEQ MEMBERS

PRESENT

Mario Bettolo, DRC Staff
Phil Goble, DRC Staff
John Hultquist, DRC Section Manager
Craig Jones, DRC Section Manager
Laura Lockhart, Attorney, Atty General's Office
Yoli Necochea, DRC Staff
Fred Nelson, Attorney, Atty General's Office
Raymond Nelson, DRC Staff
Loren Morton, DRC Section Manager
Sonja Robinson, DRC Staff

DRC STAFF/OTHER DEQ MEMBERS

PRESENT - Continue

Donna Spangler, PIO, DEQ – PPA Staff

PUBLIC

Krista Bowers, Citizen
Val J. Christensen, *EnergySolutions*
Jeff Clay, Citizen
John Couher, Citizen
Rolene Coulter, HEAL - Utah
Tim Fine, HEAL - Utah
Naomi Franklice, Citizen
Ron Hochstein, Denison Miner
James Holtkamp, Hollow & Hart
Elise Lazan, HEAL - Utah
Mark Ledoux, *EnergySolutions*
Karina Maravelias, HEAL - Utah
Brian Moench, Utah Physicians for Healthy
Environment
Janine Morgan, HEAL - Utah
Mary Ellen Navas, Citizen
Sophia Nicholas, HEAL - Utah
Amy O'Donosha, Deseret News
Vanessa Pierce, HEAL - Utah
Aurora E. Shlien, HEAL - Utah
Dan Shrum, *EnergySolutions*
Eric Spreng, HEAL - Utah
Christopher Thomas, HEAL - Utah
Kathy Vansome, Wasatch Clean Air
Cherry Wong, Citizen

- V. **Radioactive Waste**
 - b. **Presentations by HEAL-Utah, and EnergySolutions, LLC “Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste” (Board Action Item)**

**Presentation by HEAL – Utah
Additional Information:**

**RE: Board Questions Related to
Potential DU Moratorium**

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Healthy Environment ALLIANCE of Utah

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- V. Radioactive Waste
 - c. Requests to Board to Provide Comments on Depleted Uranium Disposal
(Board Information Item)
 - 2. Brian Moench, M.D.

The presumption of safety regarding Energy Solutions storing a uniquely radioactive product, depleted uranium (DU), is predicated on two assumptions.

The first is that the transportation to and storage of this material at the EnergySolutions site will have an unimaginably low risk of failure for thousands if not millions of years.

The second is that even if there is some kind of community exposure by such a failure, the public health impact of low radiation exposure will be negligible to non-existent.

We think that both of these assumptions are false or at the very least are irrationally optimistic and not supported by the science.

Regarding presumption number one.

Although tornadoes in the West are currently rare, with climate change it is unrealistic to think that over the course of thousands of years there will be no tornadoes in the area. It is no small irony that the last tornado in the Salt Lake Valley damaged the EnergySolutions basketball arena. This concern is far more than theoretical. 54 superfund sites were disrupted by Hurricanes Rita and Katrina and the public health consequences will not be fully known for decades. It is certainly conceivable that a major earthquake along the Wasatch Front, almost inevitable over the next several hundred years, could cause serious disruption of the storage system.

Depleted uranium is currently stored in large cylinders which are subject to corrosion over a matter of mere decades. In fact, according to a memo written by Alfred Walter, DOE Assistant Inspector General, the DOE has known since 2000 that the cylinders were formerly used to store phosgene gas a chemical warfare agent and were not adequately cleaned. Phosgene is a corrosive, toxic gas that may result in eventual corrosion of the cylinders. Proper maintenance requires keeping these cylinders painted every ten years, which is difficult in their current storage configurations, but it will obviously be impossible under a few feet of earth. At temperatures above 133F, a temperature sometimes exceeded in current storage circumstances, depleted uranium changes from a solid to a gas. Corroded cylinders will obviously be completely unable to contain uranium gas. With climate change increasing extreme heat episodes, the likelihood of this material entering the gas phase will steadily increase over time.

The manipulation and use of depleted uranium metal is particularly hazardous because of its pyrophoric properties. In a finely divided state, like powder or shavings, it may burst into flame spontaneously when in contact with air at ambient temperature. In more massive form it could burn in an industrial or vehicle fire. When it burns, and to a much lesser extent when it oxidizes slowly at room temperature, it gives off minute particles of uranium oxide. If inhaled, these particles, which are relatively insoluble, may become stuck in the lungs and irradiate the nearby tissue over a long period of time, provoking lung cancer. Eventually these particles become deposited in the lymph nodes, bones, brain and testes. They also contaminate the environment, virtually permanently given the half lives of the uranium isotopes.

Weather and corrosion may pale in comparison to political and business threats. According to a report published by the Associated Press, on June 17, 2009, the companies that own almost half of the nation's nuclear reactors are not setting aside enough money to dismantle the plants once they are decommissioned. Many of them may sit idle for decades and pose safety and security risks as a result. Could such a business scenario plague EnergySolutions? If at some point EnergySolutions becomes insolvent, how will the integrity of these cylinders be monitored or maintained? Obviously that burden will fall to the tax payers and the health risk to the public may be enhanced.

Regarding presumption number two:

If the residents of Utah for one reason or another became exposed to a small amount of depleted uranium would it be safe?

Beginning with Madame Curie the scientific community, and then government regulatory agencies and the nuclear industry have either consistently underestimated or exercised a shameful hubris, deception or callous disregard for the public health consequences of radioactive exposure at every stage of evolution of the nuclear industry. Between 1945 and 1963, 200,000 of our own soldiers were deliberately placed within a few miles of atomic bombs test, most of them without any protection. Thousands of Utahns became some of the early the victims of underestimating the toxicity of above ground nuclear testing. Nevada nuclear tests were sometimes delayed if the winds were blowing toward Los Angeles instead of Southern Utah.

In the years that followed there were serious proposals by Edward Teller and the Atomic Energy Commission to use hydrogen bombs for excavation projects, such as constructing a new Panama canal, detonating nuclear bombs under Colorado, New Mexico and Pennsylvania to create storage caverns for natural gas, dismissing the obvious result that the natural gas would become radioactive. The above ground environmental contamination of underground nuclear testing was also underestimated and it was allowed to continue until 1992.

The toxicity that uranium miners were exposed to was underestimated until it became obvious that they had lung cancer rates ten times higher than the rest of the population, and if they smoked, 100 times higher than everyone else. The mill tailings from the processing of uranium ore were initially thought to be benign and for several years these tailings were used as building material, incorporated into the cement poured in foundations. Eventually the folly of this became clear and those buildings had to be closely monitored for high levels of radioactivity and some of them had to be abandoned.

X-rays were once thought to be benign which resulted in the public receiving countless x-rays without thought as to the consequences of repeated exposure. Remember that taking x-rays of the feet used to be part of buying a new pair of shoes? When nuclear plants were built, by design they were allowed to release a steady stream of radiation under

normal operating conditions. Likewise little thought was given to the problem of disposing of the waste because the extent of the toxicity was not fully understood.

In 1989 the FBI raided Rocky Flats Colorado, site of a Rockwell International plutonium factory to investigate illegal burning of radioactive waste. A grand jury was convened but the Justice Dept. ignored the grand jury findings and levied modest fines against Rockwell International. Grand jurors were threatened with felony charges if they spoke to the press. 15 years later the grand jury foreman wrote a book describing his assessment: that the government used the grand jury not to prosecute illegal activity, but to cover it up. The FBI agent who led the raid, John Lipsky, agreed with the book's allegations. He said the clean up ordered by the DOE was woefully inadequate...a farce."

Finally, after years of dismissing public health concerns, the US military is now faced with mounting evidence that their use of DU munitions in the first and second Gulf Wars and the Bosnia and Kosovo Wars, is creating a public health disaster for the affected countries and our own veterans.

Because of the long, painful and sometimes shameful history that taints the nuclear industry, Utah citizens would be foolhardy not to be suspicious about whether practices at EnergySolutions or the applicable federal agencies are adequately protecting our health. In this context, classifying depleted uranium as class A waste and therefore "safe" to stockpile in Utah seems to be just the latest version of "trust us, what could go wrong?" Depleted uranium has a concentration that exceeds by 10 times the Class A waste limit of 0.05 micro curies per cubic centimeter recommended by NRC staff in a 1981 draft environmental impact statement,

Chairman Ed Markey (D-Mass.) and subcommittee member Jim Matheson (D-Utah) told the NRC in a letter: "The arbitrary and capricious mischaracterization of depleted uranium as Class A waste will undermine public confidence in the waste classification system, may increase risks to public health and safety and raises the possibility that additional, uncharacterized and possibly even more dangerous materials could be similarly treated in the future."

The tainted history of the nuclear industry while certainly relevant to this inquiry needs to be followed up by a scientific examination of the possible public health effects. To that extent, a little biographical sketch of the person who was likely the world's most qualified expert on the subject, Dr. John Gofman is very pertinent.

Dr. Gofman was a nuclear physicist, a physician, a cardiology researcher, and a professor of molecular and cell biology at UC Berkeley. He discovered the isotopes uranium 232, and 233 and protactinium 232 and 233. He was the first scientist to isolate enough plutonium to create an atomic bomb and in fact did so for the Manhattan Project. He then went to medical school and became a researcher on coronary artery disease. His pioneering work on lipoproteins became the cornerstone of modern cardiology and what we now know about "good cholesterol and bad cholesterol, HDLs and LDLs. The American College of Cardiology named him one of its 25 leading researchers.

Because Gofman was considered the most qualified researcher in the country he was asked by the Atomic Energy Commission to lead the government's research into the health effects of nuclear radiation and he did so as the head of the Lawrence Livermore Laboratories. Unfortunately he came to conclusions that the AEC did not want to hear: that being that there was no amount of radiation exposure that could be considered "safe" for the public. Independently many other eminent scientists came to similar conclusions: people such as Linus Pauling, the only two time winner of the Nobel Peace Prize, the leader of the Soviet Union's nuclear program Dr. Andrei Sakharov also a Nobel Prize winner, Drs. Arthur Tamplin, Alice Stewart, Thomas Mancuso, Karl Morgan and Harold Knapp all of whom were researchers for the AEC. Others outside of the AEC also agreed with this assessment: like Vladimir Chernousenko, who the Soviet Union placed in charge of the Chernobyl clean up, and Dr. Ernest Sternglass, professor of Radiological Physics at the U. of Pittsburg Medical School whose research and testimony played a role in Pres. Kennedy signing the Nuclear Test Ban Treaty of 1963.

The government eventually fired Dr. Gofman and many others and black balled them from research funding for refusing to back down from their assertions that radiation even in small amounts will harm public health. The idea obviously had powerful implications for the acceptability of an enormous nuclear arsenal and the nuclear power industry as well. But he never stopped speaking out against the human toll radiation exacts, predicting that nearly 1 million people would develop cancer from Chernobyl, far more than any other estimate. One of his colleagues estimated that 400,000 American infants died as a result of the nuclear bomb testing conducted in this country.

Dr. Gofman was a courageous scientist whose credentials were beyond dispute. But was he correct? Are even small radiation doses harmful, doses even smaller than those allowed by state law and used in the modeling to declare the EnergySolutions repository "safe".

A 2005 blue-ribbon panel of the National Academy of Sciences examined hundreds of articles and concluded that no safe threshold exists. Furthermore, their report states that that very low levels are more harmful per unit of radiation than higher levels of exposure, also known as the "supralinear" effect. The panel used reports from up to fifty years ago, when pelvic X-rays to pregnant women were found to double the chance that the fetus would die of cancer in childhood.

As early as 1943 Manhattan Project physicist James B. Conant in a memo to the US Army estimated that inhalation of one millionth of a gram of DU would be fatal. In this same memo DU was also recommended as a permanent terrain contaminant which could be used to destroy populations by contaminating water supplies and agricultural land with radioactive dust

DU is primarily an alpha emitter. One millionth of a gram of DU can release 1,000 alpha particles. A single alpha particle carries over 4 million electron volts of energy. It only takes 6-10 electron volts to break a DNA strand. Inhalation or absorption of a single

alpha particle can cause cancer or irreparable DNA disruption.

A 1994 General Accounting Office report to Senator John Glenn estimated that if every American received the maximum radiation exposure permitted by the government, the result would be a lifetime premature cancer death risk of one in 300, or 1 million deaths, or about 14,000 cancer deaths a year, which fits Gofman's prediction.

Will 1 million people develop cancer from exposure to Chernobyl radiation? For years the International Atomic Energy Agency insisted that only 4,000 would die. But in 2006 a report from scientists who reviewed statistics from Belarus, projected that 270,000 would develop cancer. Research continues, but with 5 million to 8 million people still living in highly contaminated areas, Gofman's estimate may yet prove to be correct. Wildlife has continued to decline in the area and is showing very high rates of DNA damage.

Did thousands of infants die from bomb fallout half a century ago? The period 1950-1963 remains as the only part of the twentieth century in which infant deaths did not fall sharply, and is still unexplained. In 1992 British scientist R.K. Whyte published a paper in the British Medical Journal concluding that bomb fallout was the likely reason.

Do medical X-rays give people cancer? A storm of protest is growing over the number of X-rays, especially CT scans, administered to children, who are most susceptible to harm from radiation. The National Cancer Institute now cautions that physicians should only conduct pediatric CT scans when necessary, adjust exposure parameters, minimize use of multiple scans in a single examination and consider alternatives to CT scans.

It is noteworthy that Dr. Gofman's most important scientific work has not been invalidated, even though some of his conclusions are commonly dismissed, or ignored by those who cheerlead for a more robust nuclear industry and by those who think Utah should store DU.

What evidence is there that exposure to DU can harm the public? Use of DU in armor piercing ammunition in the first and second Gulf Wars, and the war in Kosovo is strongly defended by the military. Recall that the military fiercely defended the use of Agent Orange in Vietnam even though the dioxins it contained are the second most toxic substance ever made by man, plutonium being the first.

Few actual scientific studies have been generated because it appears that there is little US government interest in investigating whether their use of DU amounted to a widespread public health disaster. Funding sources are almost non-existent. However, most non government medical observers consider exposure to DU as the most likely cause of Gulf War Syndrome. Consider these additional observations:

Ten years after Desert Storm, of the 580,400 soldiers who served, 56% are now on permanent medical disability despite the fact that only 467 were actually wounded according to the Encyclopedia Britannica's Almanac 2003.

After the "Shock and Awe" campaign in Iraq in 2003, very fine particles of depleted uranium were captured with larger sand and dust particles in air filters in Britain. These particles traveled 2400 miles in 7-9 days. . Salt Lake City is only 74 miles from Clive.

In vitro studies of human lung cells show extensive chromosomal disruption when exposed to DU contaminated dust.

Veterans of Desert Storm and the wars in Bosnia and Kosovo have been found to have up to 14 times the normal level of genetic damage in their chromosomes. DU is detectable in the urine 20 years after exposure.

Dr. Asaf Durakovic, Chief of Nuclear Medicine for the Veterans Administration and advisor to the National Science Foundation, states that, "Because of the chemical and radiological toxicity of DU, even a small number of particles trapped in the lungs, kidneys, and bone greatly increase the risk of cancer and all other illnesses over time." According to Durakovic, symptoms associated with DU poisoning are: emotional and mental deterioration, fatigue, loss of bowel and bladder control, and numerous forms of cancer. Such symptoms are increasingly showing up in Iraqi children and among Gulf War veterans and their offspring.

Four years after the Gulf War of 1991, Life magazine published a photo-essay entitled "The Tiny Victims of Desert Storm," which focused on the numerous cases of severe birth defects that had occurred in families of veterans from that war. Life reported, "Of the 400 sick vets who had already answered Sen. Don Riegle's Senate Banking Committee inquiries, a startling 65 percent reported birth defects or immune-system problems in children conceived after the war."

In one unit of 20 soldiers that invaded Iraq in 2003, within 18 months, 8 of them, or 40% had come down with some form of cancer.

A study compared 15,000 Desert Storm Vets to 15,000 non Desert Storm Vets. It showed that from the Desert Storm Vets, men were twice as likely to father children with birth defects after the War and women were three times more likely.

Studies by the US Armed Forces Radiobiology Research Institute have led the authors to conclude that moderate exposures to either Uranium or DU present a significant toxicologic threat.

Other surveys show extremely high rates of illnesses in the spouses and children of Gulf War Veterans. Doctors in southern Iraq are seeing a dramatic increase in childhood cancers like leukemia. Hard statistics are difficult to verify, but they estimate the rate

increase is on the order of 1,000%. Doctors in Serbia reported cancer rates had tripled within 3 years after their war ended.

Fallon, Nevada population 7,500 has by far the highest rate of childhood leukemia in the nation, 64 times the national average. It may only be coincidence but thousands of tons of DU were used for decades at four bombing and gunnery ranges in Fallon, Nevada.

A surprising announcement by U.S. Department of Energy officials on January 29, 2000 acknowledged, after many years of denial, that employees of their facilities had significantly higher incident rates for leukemia; Hodgkin's lymphoma; and cancers of the prostate, kidney, liver, salivary glands, and lungs.

There is no way to prove without doubt that EnergySolution's storing depleted uranium will harm Utah residents now or in the future. But that is not the standard you should insist on to implement a moratorium. A wealth of ominous circumstantial evidence has accumulated suggesting that public exposure to DU is potentially a dreadfully serious and long term public health issue that has no remediation. We urge you to follow the precautionary principle that guides physicians in their encounters with patients. Whenever there is doubt, do for the patient whatever represents the least amount of risk.

Sincerely,

The Utah Physicians for a Healthy Environment
Dr. Brian Moench
Dr. Scott Hurst
Dr. Cris Cowley

DEPLETED URANIUM DISPOSAL

Radiation Control Board Meeting
July 14, 2009

1

3 Important Definitions:

1. Radioactivity: Some atoms are unstable and undergo a spontaneous decay process, emitting one or more types of radiation until stability is reached.
2. Curie: The rate of decay is called activity, which is the number of disintegrations per second, 1 curie is equal to 3.7×10^{10} d/sec or 37 billion

2

3 Important Definitions:

3. Half-Life: The period of time it takes for $\frac{1}{2}$ of the unstable atoms to transform to other unstable atoms or to a stable atom.

Ex: Carbon-14 \rightarrow Nitrogen-14 (Stable)

Half-life= 5703 yrs

Americium-241 \rightarrow Neptunium-237

Half-life=433 yrs (Radioactive)

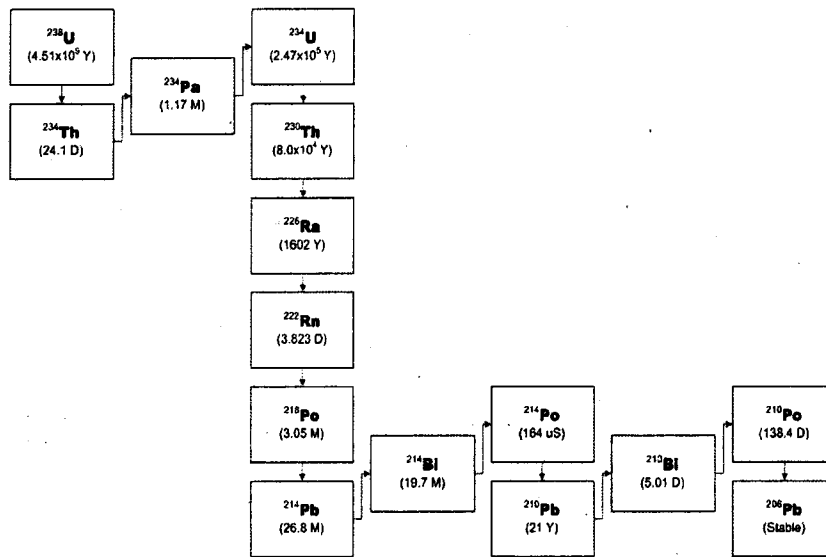
3

What is Depleted Uranium?

Natural Uranium	U-238	99.276%
Isotopes	U-235	0.7196%
	U-234	0.0057%
Depleted Uranium	U-238	99.8%
Isotopes	U-235	0.2%
	U-234	0.001%

4

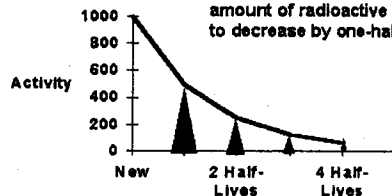
URANIUM DECAY SERIES

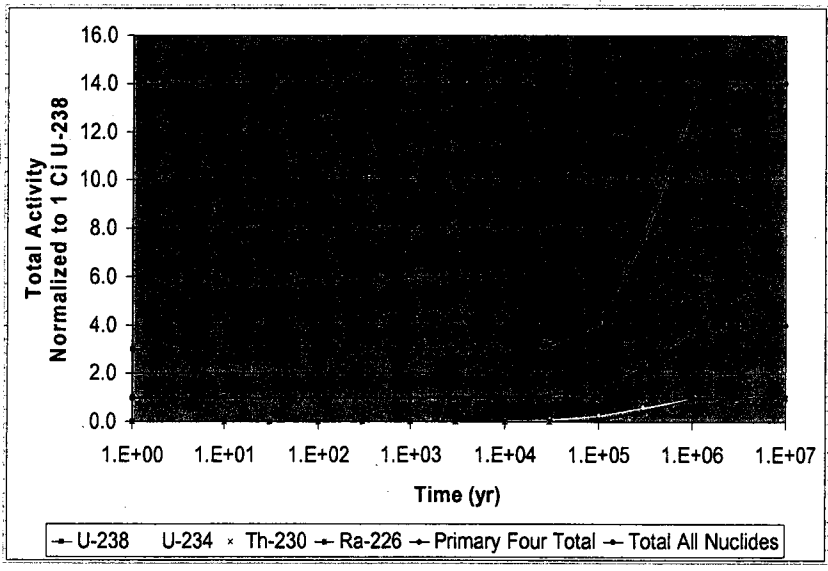


Half-Life

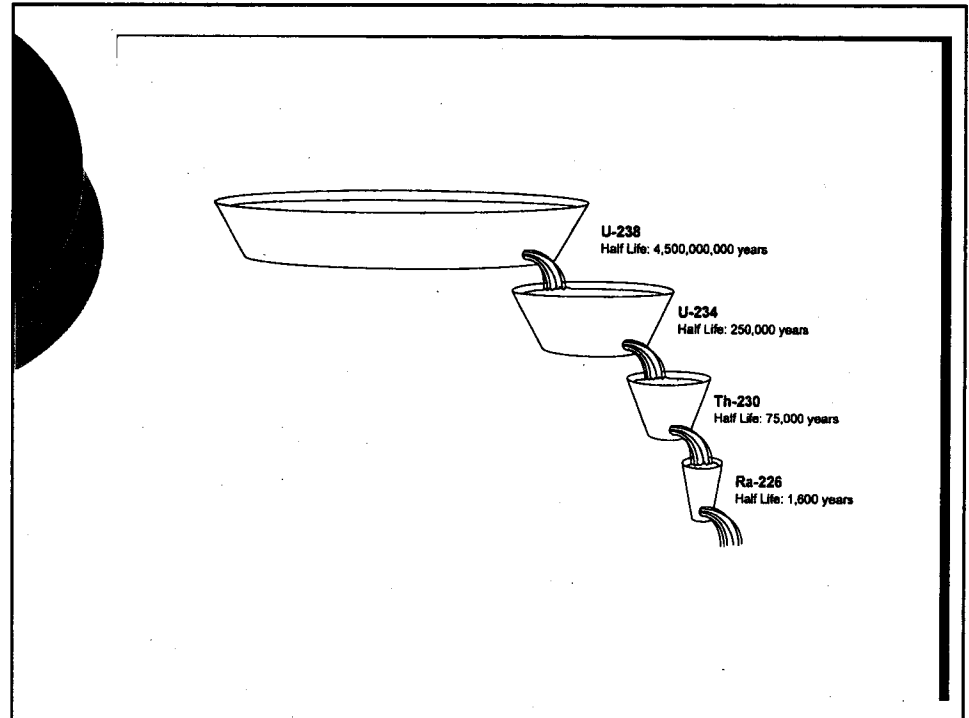


The time required for the amount of radioactive material to decrease by one-half





7



Differences: DU vs. Natural Uranium

- DU has approximately 3 times less U-235 and U-234
- Consequently, the radiation doses from DU are approximately 60% less than U-Natural
- Behavior of DU in the body is the same as natural uranium

World Health Org. /factsheet no 257, Revised 1/2003

9

DU Disposed @ EnergySolutions

- Approximately 48, 000 tons of DU has been disposed in 6.53 million cubic yards of LLRW waste. In the majority of the cases, the DU is very diffuse and concentrations are low in the waste matrix.
- Future DU disposal may include large volumes of DU that are not diffuse, a concentrated mass of uranium-238 oxide.

10

Regulatory Approach to LLRW Disposal

Site Selection – Natural conditions are conducive to long term isolation

Geologic Hydrologic
Seismic Remote Location
Climate
Lack of Mineral resources

11

Regulatory Approach to LLRW Disposal

Engineered Disposal Barriers –
Natural Materials in Construction of
Cover Systems and Liners

EX: Rock Armor

Erosion

Biointrusion

Human Intrusion

Clay Liner

12

Regulatory Approach to LLRW Disposal

Administrative Controls

1. Restrictive Covenants on Land title
2. Zoning Restrictions-Tooele County
3. Record Keeping-State and Tooele County

13

Regulatory Approach to LLRW Disposal

Perpetual Care Fund

Funding to correct future issues

14

WHY

- To Prevent Contact with Disposed Waste
- To Prevent Release to the Environment. Maintain Isolation.

Question ?
Compliance Over What Time
Period?

15

What is Performance Assessment

An **iterative** process, involving a site-specific, prospective modeling evaluation of the post-closure time period to determine:

- Whether reasonable assurance of compliance and quantitative performance objectives can be met, and

16



What is Performance Assessment

- To identify critical data, facility design elements and model development needed for determining waste disposal site operating limits and providing defensible and cost effective licensing decision.

17



What is Performance Assessment

In plain terms, performance evaluations provide, significantly but not exclusively, the technical basis for the design, operation and closure of the low-level radioactive waste disposal facility during the license review process.

18

Components of Assessment Modeling

Source Term – The radiologic, biologic, chemical and physical characteristics of proposed waste. (Existing performance evaluations for U-238 assume a maximum possible activity of uranium and decay products.)

Facility Design – Cover System and infiltration, bottom liners, seismic stability, closure requirements and overall engineering design features.

19

Pathways Analysis – An evaluation of potential exposures including: food chain, including surface water resources, inadvertent chronic or acute human exposure, atmospheric transport and biotic transport and many, many others.

Ground Water Flow and Transport (A critical pathway for the Clive Site)

Evaluation of Uncertainty and Sensitivity - Model inputs and assumptions are subject to alternative approaches and scenarios.

Example: Site semi-arid or inundated

20



Possible Impacts of the Nuclear Regulatory Commission Rulemaking

- Two new considerations for an updated performance evaluation for the EnergySolutions disposal facility.
 - Disposal of diffuse depleted uranium versus disposal of large mass quantities, and
 - Time period for demonstrating compliance with performance objectives and rules.

21



Possible Impacts of the Nuclear Regulatory Commission Rulemaking

- A revised performance evaluation must consider the entire waste disposal site inventory of radionuclide including all sources of uranium, radium and other radioisotopes of concern for the performance time period.

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RADIATION CONTROL BOARD

Department of Environmental Quality (Bldg #2),
Conference Room 101, 168 North 1950 West, Salt Lake City, Utah
July 14, 2009

TENTATIVE AGENDA

Work Meeting

2:30 p.m. to 3:00 p.m.

Technical aspects of Depleted Uranium disposal

Regularly Scheduled Board Meeting

3:00 p.m. to 5:00 p.m.

- I. Minutes (**Board Action Item**)
 - a. Approval of the Minutes from the June 9, 2009 Board Meeting
- II. Rules
No Items
- III. Radioactive Materials Licensing/Inspection
No Items
- IV. X-Ray Registration/Inspection
No Items
- V. Radioactive Waste
 - a. Presentation by Laura Lockhart: Utah Code Annotated § 19-3-104(8) "No More Stringent" Rule (**Board Information Item**)
 - b. Presentations by HEAL-Utah, and EnergySolutions, LLC "Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste" (**Board Action Item**)
 - c. Requests to Board to Provide Comments on Depleted Uranium Disposal (**Board Information Item**)
 1. Stephen T. Nelson, Ph.D.
 2. Brian Moench, M.D.
- VI. Uranium Mill Licensing and Inspection
No Items
- VII. Other Division Issues (**Board Information Item**)
 - a. Division Activities Report
- VIII. Public Comment
- IX. **The Next Scheduled Board Meeting: August 11, 2009 (Tuesday)**, DEQ Bldg #2, Conference Room 101, 168 North 1950 West, Salt Lake City, Utah 3:00 – 5:00 P.M.

1	<p>I. Minutes (Board Action Item)</p> <p>a. Approval of the Minutes from the June 9, 2009 Board Meeting</p>
2	<p>II. Rules</p> <p>No Items</p>
3	<p>III. Radioactive Materials Licensing/Inspection</p> <p>No Items</p>
4	<p>IV. X-Ray Registration/Inspection</p> <p>No Items</p>
5	<p>V. Radioactive Waste (Board Information Items)</p> <p>a. Presentation by Laura Lockhart: Utah Code Annotated § 19-3-104(8) "No More Stringent" Rule (Board Information Item)</p> <p>b. Presentations by HEAL-Utah, and EnergySolutions, LLC "Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste" (Board Action Item)</p> <p>c. Requests to Board to Provide Comments on Depleted Uranium Disposal (Board Information Item)</p> <p>1. Stephen T. Nelson, Ph.D. 2. Brian Moench, M.D.</p>
6	<p>VI. Uranium Mill Licensing and Inspection</p> <p>No Items</p>
7	<p>VII. Other Division Issues (Board Info Items)</p> <p>a. Division Activities Report</p> <p>VIII. Public Comment</p>
8	<p>IX. Other Issues:</p> <p>The Next Scheduled Board Meeting: August 11, 2009, (Tuesday), DEQ Bldg #2, Conference Room 101, 168 North 1950 West, Salt Lake City, Utah, 3:00 – 5:00 P.M.</p>

- I. **Minutes (Board Action Item)**
 - a. Approval of the Minutes from the June 9, 2009 Board Meeting

MINUTES
OF
THE UTAH RADIATION CONTROL BOARD

June 9, 2009

Department of Environmental Quality, DEQ Building #2

Conference Room 101

168 N 1950 W

Salt Lake City, Utah 84114-4850

BOARD MEMBERS PRESENT

Peter A. Jenkins, M.S., CHP, Chair
Elizabeth Goryunova, M.S., Vice Chair
Dane L. Finerfrock, Executive Secretary
Scott Bird
Patrick D. Cone

Colleen Johnson
Edd C. Johnson
Douglas S. Kimball, DMD
Amanda Smith, Acting DEQ Executive Director
John W. Thomson, M.D.
David A. Tripp, Ph.D.

BOARD MEMBERS ABSENT/EXCUSED

Frank D. DeRosso, MSPH, CIH
Christian K. Gardner
Joseph K. Miner, M.D., MSPH

DRC STAFF/OTHER DEQ MEMBERS

PRESENT

Mario Bettolo, DRC Staff
Phil Goble, DRC Staff
John Hultquist, DRC Section Manager
Craig Jones, DRC Section Manager
Laura Lockhart, Attorney, Atty General's Office
Yoli Necochea, DRC Staff
Fred Nelson, Attorney, Atty General's Office
Raymond Nelson, DRC Staff
Loren Morton, DRC Section Manager
Sonja Robinson, DRC Staff

DRC STAFF/OTHER DEQ MEMBERS

PRESENT - Continue

Donna Spangler, PIO, DEQ – PPA Staff

PUBLIC

Krista Bowers, Citizen
Val J. Christensen, *EnergySolutions*
Jeff Clay, Citizen
John Couher, Citizen
Rolene Coulter, HEAL - Utah
Tim Fine, HEAL - Utah
Naomi Franklice, Citizen
Ron Hochstein, Denison Miner
James Holtkamp, Hollow & Hart
Elise Lazan, HEAL - Utah
Mark Ledoux, *EnergySolutions*
Karina Maravelias, HEAL - Utah
Brian Moench, Utah Physicians for Healthy
Environment
Janine Morgan, HEAL - Utah
Mary Ellen Navas, Citizen
Sophia Nicholas, HEAL - Utah
Amy O'Donoshia, Deseret News
Vanessa Pierce, HEAL - Utah
Aurora E. Shlien, HEAL - Utah
Dan Shrum, *EnergySolutions*
Eric Spreng, HEAL - Utah
Christopher Thomas, HEAL - Utah
Kathy Vansome, Wasatch Clean Air
Cherry Wong, Citizen

GREETINGS/MEETING CALLED TO ORDER

The Utah Radiation Control Board convened in the Department of Environmental Quality (DEQ), Conference Room 101, 168 North 1950 West, DEQ Bldg. 2, Salt Lake City, Utah. Peter A. Jenkins, Chair, called the meeting to order at 3:00 p.m. He welcomed the Board Members and the public. Chairman Jenkins indicated that if the public wished to address any items on the agenda, they should sign the public sign-in sheet. Those desiring to comment would be given an opportunity to address their concerns during the comment period.

I. APPROVAL OF MINUTES (Board Action Item)

a. Approval of the Minutes from the April 14, 2009 Board Meeting

Peter A. Jenkins, Chair, asked the Board members for corrections to the minutes from the May 12, 2009 Board meeting. Edd Johnson requested the following correction to the minutes:

1. Page 6, Item VII.a., first paragraph on top of page, first sentence which reads: "William J. Sinclair, Acting DEQ Director, reported that at the NWIC'S **May and September 2009** meetings ..."
Changed to read: "**September 2008 and May 2009** meetings ..."

MOTION MADE BY SCOTT BIRD TO APPROVE THE MINUTES OF MAY 12, 2009 WITH THE AMENDED CHANGES

MOTION SECONDED BY DOUGLAS S. KIMBALL

MOTION CARRIED AND PASSED UNANIMOUSLY

**II. RULES
No Items**

**III. RADIOACTIVE MATERIALS LICENSING/INSPECTION
No Items**

**IV. X-RAY REGISTRATION/INSPECTION
No Items**

V. Radioactive Waste (Board Information Item)

a. Response to the Board's Questions Regarding a Moratorium on Depleted Uranium (DU) Disposal

Peter A. Jenkins, Chairman, reminded the Board that at the last meeting they had a presentation by Christopher Thomas, from HEAL-Utah, addressing some issues on Depleted Uranium (DU) disposal in Utah. Mr. Jenkins said that after Mr. Thomas presentation, he asked Laura Lockhart, Attorney, from the Attorney General's Office, to provide the Board with additional information on this item. Laura Lockhart, Attorney, went over

the information she had submitted to the Board : the memo, and the proposed rule entitled "Depleted Uranium – Options for Regulation." After her presentation Ms. Lockhart asked the Board if they had any questions. (See attached information)

The following is a summary of the questions and discussions held by the Board members on this issue:

Questions by the Board:

The Board discussed whether to impose a moratorium or to issue a Rulemaking by Order as it had been suggested. The Board felt they needed additional information to clarify which path to take on this issue. They discussed the possibility of having two opposing parties present some technical information on the impact and the effects of Depleted Uranium on the health and safety to the citizens of Utah and to the environment. They also, discussed whether a moratorium could be imposed or not, or if they needed to implement a rule for Depleted Uranium. The Board asked representative's from the opposing parties: *EnergySolutions* and HEAL – Utah, to briefly describe how they would be effected by their decision.

After hearing from both parties, Elizabeth Goryunova said that she would favor a moratorium, but felt that there was still a lot of unclear information on the moratorium to be able to make a decision. She said that she did not feel it was fair to force the decision upon the Board although, she felt the Board should move forward in protecting the public. Ms. Goryunova said the Board should hold some hearings and get additional information to clarify for the Board which path they should take. Edd C. Johnson, agreed with Ms. Goryunova's suggestion and felt that the Board should have the technical side presented to them from each opposing party. Peter A. Jenkins, Chairman, called for a motion on Elizabeth Goryunova's and Edd Johnson's comments.

MOTION MADE BY DAVID A. TRIPP THAT THE BOARD, REGARDLESS OF THE "NO MORE STRINGENT RULE," TO FURTHER INVESTIGATE THE ISSUE ON DEPLETED URANIUM, BY HAVING TECHINCAL PRESENTATIONS FROM THE OPPOSING PARTIES OF ENERGYSOLUTIONS LLC, AND HEAL – UTAH, AT THE NEXT SCHEDULED BOARD MEETING

Peter A. Jenkins, Chairman, asked the Board members if someone would like to second the motion or whether they would like to have a discussion on this motion. The Board discussed amending the original motion to include more parties on the discussion of the technical presentations. The Board discussed and agreed to also, include the legal aspects of the

discussion and to invite representatives from the Attorney General's Office. David A. Tripp, suggested that they also, include Nuclear Physicists' in the discussions on Depleted Uranium (DU).

The Board agreed to amend the original motion to include several different parties to present the technical presentations on this issue. The Board decided to hear from the parties of: (1) EnergySolutions LLC, (2) HEAL-Utah, (3) the Attorney General's Office and from (3) Nuclear Physicists'. The Board also, discussed and agreed on allowing each of the parties fifteen minutes for the technical presentations. Therefore, the Board felt it was necessary to schedule a July, 2009 Board meeting and voted on this motion which passed to schedule the meeting. (See Item IX.)

Peter A. Jenkins, Chairman, said that David A. Tripp's original motion should be amended to reflect the additional changes they had just discussed. The motion was amended to read:

MOTION AMENED BY DAVID A. TRIPP THAT THE BOARD, REGARDLESS OF THE "NO MORE STRINGENT RULE," TO FURTHER INVESTIGATE THE ISSUE ON DEPLETED URANIUM BY HAVING TECHNICAL PRESENTATIONS FROM THE OPPOSING PARTIES OF ENERGYSOLUTIONS LLC, HEAL – UTAH, THE ATTORNEY GENERAL'S OFFICE AND NUCLEAR PHYSICISTS', AND TO ALLOW EACH PARTY FIFTEEN MINUTES FOR THEIR PRESENTATIONS, TO BE PRESENTED AT THE JULY, 2009 BOARD MEETING

SECONDED BY EDD C. JOHNSON

MOTION CARRIED AND PASSED UNANIMOUSLY

PUBLIC COMMENT:

Christopher Thomas, HEAL – Utah, had the following comments on this item to the Board:

Mr. Thomas said he would like to point out different aspects on the issue of Depleted Uranium. He said the recent NRC decision on DU suggested that there was a lack of a rule. He said there were no analysis underlined that there was a rule for large quantities of DU. He said this was why NRC was going to promulgate a new rule. Mr. Thomas said he did not foresee that the Board would be passing a moratorium. He said he did not necessarily see the rule as a "more stringent dialect," but rather that there was a lack of acknowledgement of the rule at the Federal level. Mr. Thomas said that the State would simply be saying in the interim; "while there is no Federal rule we are going to implement our own rule that will

adequately protect the health and safety of our citizens in Utah.” He said this was one issue that he thought was a bit different.

Mr. Thomas said that at a previous Board meeting there was a discussion held and it was suggested that there was a parallel between DU disposal and mill tailings. He said because this is another thing that’s got uranium in the title, and it should be treated either compatibly or not compatibly. He said he decided to track some information on this after it was mentioned at the meeting. Mr. Thomas said that he discovered that government ownership was required for mill tailings which would also apply to the EnergySolutions site. Mr. Thomas said that only part of that site would be owned by the Federal government the perpetuity part because of the vitro tailings and the 11.e2 cell. He said the part on DU should actually be higher than for mill tailings. Mr. Thomas said that DU imposes a higher risk hazard from radium in uranium mill tailings which is at its peak when it is initially being dispose. Mr. Thomas said that by contrast the risk from radium from DU continues to grow over time at a magnitude larger than for uranium mill tailings. He said if there is perpetual ownership required of mill tailings then the Board would certainly well be within their rights to require some sort of ownership for long-term disposal of DU. Mr. Thomas said there was a rule in place to deal with long-term hazards of mill tailings. He said that Ms. Lockhart had mentioned that there was a greater hazard imposed on DU requiring government ownership.

VI. URANIUM MILL LICENSING AND INSPECTION (Board Information Item)

a. Status of the White Mesa Uranium Mill, Blanding, Utah

Ron Hochstein, President of Denison Mines, informed the Board on this item. After his presentation Mr. Hochstein asked the Board whether they had any questions. (Attached is the information Mr. Hochstein presented)

Questions by the Board:

Patrick D. Cone, asked Dane Finerfrock, Executive Secretary, if the Department had completed an analysis of the infrastructure of the workload versus the overall fee structure to complete the regulation.

Dane Finerfrock, Executive Secretary, responded that the fees on the mill had just recently been increased and would be effective July 1, 2009. Mr. Finerfrock said that there was an analysis done in order to support the fee schedule increase. He said that this fee schedule had gone out for public comment on September 2008. He said that those impacted by the fee schedule changes had sufficient time to contest it. Mr. Finerfrock

explained that there were other parts of the fee schedule which required the approval of the legislature. He said that this was the part that the Department had been working on, the disposal fees relating to EnergySolutions. He said that Mr. William J. Sinclair, had explained this process regarding the stakeholders group at the last Board meeting. Mr. Finerfrock said that the stakeholders group along with the Department would be looking at the fee schedule to see whether they felt it was necessary to raise the fees. Upon making a final decision they would then inform the legislature and they could then impose the new fee schedule.

VII. OTHER DIVISION ISSUES

a. Modifying the Board Policy: "Requests Made by the Public to be Placed on the Board Agenda" (Board Action Item)

Peter A. Jenkins, Chairman, informed the Board on this item. Mr. Jenkins asked the Board to recall that at the last Board meeting they made a motion to change the Board's policy regarding individuals addressing the Board. Mr. Jenkins said that he requested an amendment to the policy. He said that individuals addressing the Board should provide their presentation and handout materials to the Executive Secretary in a timely manner to allow the Board sufficient time to review their material. He said this would give the Board enough time to address comments they might have at the Board meeting.

Mr. Jenkins explained that the Board made a motion at the last Board meeting which passed. He said he had rewritten the policy which was in the Board packet. There were no questions by the Board members.

MOTION MADE BY DAVID A. TRIPP TO ADOPT THE NEW WRITTEN POLICY FOR INDIVIDUALS ADDRESSING THE BOARD EFFECTIVE IMMEDIATELY

SECONDED BY ELIZABETH GORYUNOVA

MOTION CARRIED AND PASSED UNANIMOUSLY

b. Division Activities Report (Board Information Item)

Peter A. Jenkins, Chair, informed the Board that this was currently a new item where the Division provides the Board with a summary of their monthly activities. Mr. Jenkins asked the Board whether they had any question on the summary report. The following questions were asked and discussed:

Questions by the Board:

Patrick D. Cone asked DRC Staff for an update on the settlement agreement for "the Notice of Violation and Order, Shootaring Canyon Mill, Utah Ground Water Discharge Permit No. UGW170003."

Loren Morton, DRC Section Manager, explained this item to the Board. Mr. Morton said that a Notice of Violation was issued to Uranium One regarding ground watering problems and the report context on the actions that were submitted. He said they had since resubmitted and completed the information and the Division found the report to be acceptable. The Division then levied a penalty for the violations and the company agreed to the settlement terms and the dollar amount had also been settled. Mr. Morton explained that a settlement agreement represents a way of closing an enforcement action. He said that a check was received and the Division considered this violation settled.

David A. Tripp, asked how the penalty fee on the settlement agreement of \$3,866.57, had been figured and imposed on the company.

Loren Morton, DRC Section Manager, explained that this was a Water Quality Violation, the Division then referred to the rules under Part 317. Mr. Morton said that there were guidelines on how to calculate the penalty amounts. He said the Division had followed the guidelines to come to the conclusion on the very last dollar and cent amount.

VIII. PUBLIC COMMENT

Please refer to Item V. a.

IX. The Next Scheduled Board Meeting: July 14, 2009 (Tuesday), DEQ Bldg #2, Conference Room 101, 168 North 1950 West, Salt Lake City, Utah 3:00 – 5:00 P.M. THE BOARD MEETING ADJOURNED AT 4:54 P.M.

Peter A. Jenkins, Chairman, discussed with Board members whether they should schedule a July 2009 Board meeting. The Board members discussed the upcoming issues that would be on the agenda, therefore they felt it was necessary to schedule a July Board meeting. The Board made the following motion:

MOTION MADE BY DAVID A. TRIPP TO SCHEDULE A JULY BOARD MEETING

SECONDED BY EDD C. JOHNSON

MOTION CARRIED AND PASSED UNANIMOUSLY

VI. Uranium Mill Licensing and Inspection (Board Information Item)
a. Status of the White Mesa Uranium Mill, Blanding, Utah

Presentation by Ron Hochstein, President of Denison Mines

Handout Distributed to DRC Board Members

Thank you

Mr. Chairman, and members of the Radiation Control Board, my name is Ron Hochstein and I am President and Chief Executive Officer of Denison Mines (USA) Corp. I appreciate the opportunity to speak to you today about the current status of the uranium industry and in particular Denison's uranium operations in Utah.

For those of you whom are new to the board, Denison is a publically traded company with uranium recovery operations in the western US, and Canada, and exploration and development projects in Canada, Mongolia, and Africa. Our holdings in the U.S. include 3 operating uranium mines in Colorado and Utah, and the only operating uranium mill in the U.S., located in San Juan County, near Blanding, Utah. Denison also has several mines in Utah and Colorado currently on standby, and 4 partially developed mines in northern Arizona.

The uranium market experienced a sharp rise in prices beginning in late 2005, peaking at \$135 per pound U_3O_8 in mid 2007. In response to the initial rise in prices, Denison opened 7 mines in Utah and Colorado. Since then the spot price has fallen to as low as \$40 per pound, but is showing recent signs of strengthening and most recently was quoted at \$50 per pound U_3O_8 .

With the softening of uranium and vanadium prices over the last 18 months we were forced to place a total of 4 mines on standby, and most recently cease processing of conventional ore at the White Mesa mill. Late last year, the company placed into standby the Tony M mine, near Ticaboo, Utah, and most recently the Rim Mine near Monticello, Utah. Denison is currently operating the Pandora and Beaver mines near La Sal, Utah and the West Sunday mine in Colorado. We are hopeful that the recent rise in the spot price of uranium will continue and we can resume operations at those mines on stand-by.

Ore produced from the mines is shipped to the White Mesa Mill, located 6 miles south of Blanding, Utah. Ore from the mines is transported to the Mill by highway trucks operating under US Department of Transportation regulations, and Denison's own company mandated requirements. In 2008, the mill received over 11,570 trucks hauling conventional ore.

The White Mesa Mill is one of only four conventional uranium mills remaining in the US, and the only one that is fully permitted and operational. The Mill began processing conventional ore in April 2008, and processed conventional ore until the end of May of this year. Although the Mill is 29 years old it is in excellent shape, with \$31 million of capital improvements and upgrades over the last two

years, including a new triple lined state-of-the-art tailings cell. In 2008, the Mill processed 249,000 tons of ore and recovered 800,000 pounds of U₃O₈, and 1.2 million pounds of V₂O₅, a by-product metal contained with the uranium in all the mines in eastern Utah. Vanadium is used in the production of high strength steel. In 2009, the Mill is budgeted to produce approximately 700,000 pounds U₃O₈, and 500,000 pounds of V₂O₅.

As stated earlier, conventional ore processing at the White Mesa mill has been suspended; however, Denison will continue to be producing uranium for the remainder of the year through the processing of alternate feed material. We will be starting up a new alternate feed circuit this month. This circuit is designed to process ^{these} ~~alternate feed~~ materials more efficiently than in the past. This circuit will operate throughout the remainder of the year and continuously going forward. We are planning on restarting conventional ore processing in early 2010 in order to fulfill long term contractual commitments.

Denison currently employs approximately 160 people in our U.S. mining and milling operations, and an additional 134 contractor personnel. Of the 134 contractor personnel, 59 are employees of White Mesa Inc., a Native American owned small business headquartered in White Mesa, Utah. The majority of our

employees and contractors are Utah-based. I'm very proud of our employees as they reached an important safety milestone in April with over 1.0 million manhours worked without a Lost Time Accident. at the White Mesa mill.

Substantially all of the uranium that is produced in the US, as well as from other international producers, is used in nuclear reactors for the generation of electricity. The only other significant use is in the production of medical isotopes. The yellowcake that Denison produces undergoes three additional, and costly, steps before it is usable as reactor fuel. The current worldwide demand for uranium is approximately 184 million pounds U₃O₈ per year, with primary production only 114 million pounds per year. The remainder is made up from secondary sources of supply such as inventories held by producers and utilities, government inventories and uranium recycled from nuclear weapons. Currently approximately 50% of the U.S. uranium demand is satisfied from uranium supplied from down blended Soviet nuclear weapons. This program will end in 2013.

There are currently 436 reactors in the world, 104 of them in the US. Nuclear power generates approximately 20% of the electricity used in the US. There are currently 29 applications for new reactors in the US, and several other countries, particularly China, India, Japan and South Korea, as well as some European

countries, have aggressive plans for expansion of nuclear power. Nuclear power's current and future contribution to reducing greenhouse gases cannot be ignored.

Based upon recent assessments of future secondary uranium supply, combined with the uranium industry's production forecast, and expected nuclear generating capacity – there is a growing requirement for increased uranium production. Based upon the second quarter Ux Consulting report, world uranium demand is forecast to increase from its 2008 level of 184 million pounds to 234 million pounds by 2020. At the same time, supply from secondary sources is expected to drop from 47 million pounds in 2008 to 15 million pounds in 2020. As a result, uranium production will need to expand significantly to meet the increasing demand.

Denison's operations provide significant economic benefit to the citizens and institutions of the State. Since the beginning of 2006, the company has paid over \$23 million in wages to our Utah employees; we have paid almost \$1.1 million in State and local property taxes, and have paid the State School and Institutional Trust Lands Administration almost \$2.3 million in fees and royalties.

Since August of 2004, the operations at the White Mesa mill have been regulated by the UDEQ, Division of Radiation Control. As with any new relationship, the

first couple of years were a bit rocky, but now we understand better what is expected by the Division and we are moving forward. Denison still has a ways to go to improve, but we are getting there. And over the past five years, there has been no shortage of activities.

Since the transition, the Division has implemented an amended Radioactive Materials License, which was based on the mill's NRC Source Materials License, a new Groundwater Discharge Permit, which has increased the groundwater monitoring from 6 parameters from 4 wells, to 38 parameters at 26 wells; a Best Management Practices Plan, a Stormwater Management Plan, a license amendment for the Fansteel alternate feed material, a tailings sampling plan and a seeps and springs sampling plan, and the licensing of a new tailings cell, to name but a few. This is in addition to the ongoing inspections and review of quarterly and semi-annual reports that are filed by us.

Currently, Denison has numerous submittals in with the Division including: the Chloroform Corrective Action Plan, a license amendment and design permit approval for tailings cell 4B, the license renewal application, an amendment to the Groundwater Discharge Permit, as well as a few minor operational license amendments.

The Division of Radiation Control is a tough regulator in their duty to protect the environment in the State of Utah, but also fair and responsive to our permitting needs; however, your support in increasing the number of staff within the Department is important to ensure that they can be responsive to all stakeholders needs.

Mr. Chairman, I appreciate the committee's time, and I am happy to answer any questions.



Radiation Control Board

June 9, 2009

MEETING THE CHALLENGE



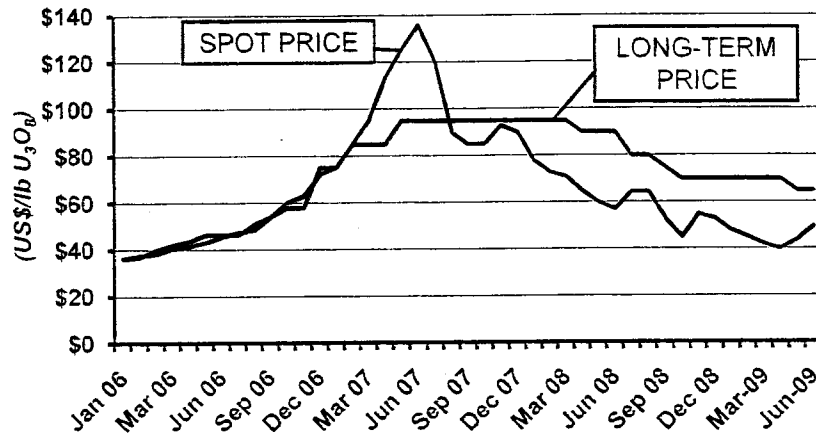
Denison Quick Facts (TSX: DML, NYSE AMEX: DNN)

- Exploration, development, mining, milling
- Assets in Canada, U.S., Zambia, Mongolia
- 3 operating mines in North America
- 2 uranium mills in North America
- 2008 U₃O₈ production: 1.6 million lbs
 - More than double 2007 production
- 2009 U₃O₈ production: 1.4 million lbs

MEETING THE CHALLENGE



U₃O₈ Spot and Long-term Prices (As of June 8/09)



Published by UxCo.

MEETING THE CHALLENGE



U.S. Production

- Sunday, Rim & Tony M on standby
- Standby mines can be restarted to meet sales contracts
- U.S. production can produce 1.7 million lbs/year



MEETING THE CHALLENGE



White Mesa Mill

- Conventional ore processing started April/08
 - White Mesa only operating conventional uranium ore processing facility in U.S.
- 2008: completed \$31 million mill modernization & relining of Tailings Cell 4A
- 2008 production
 - 0.8 million lbs U_3O_8
 - 1.2 million lbs V_2O_5

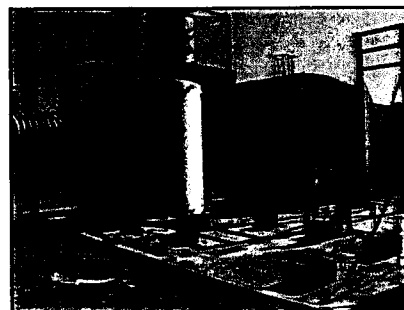


MEETING THE CHALLENGE



White Mesa Mill

- Conventional ore processing ended May/09
- \$5 million alternate feed circuit :
 - Operational by June
 - 2009 output: 160,000 lbs
- 2009 production
 - 0.7 million lbs U_3O_8
 - 0.5 million lbs V_2O_5



MEETING THE CHALLENGE



Uranium Market

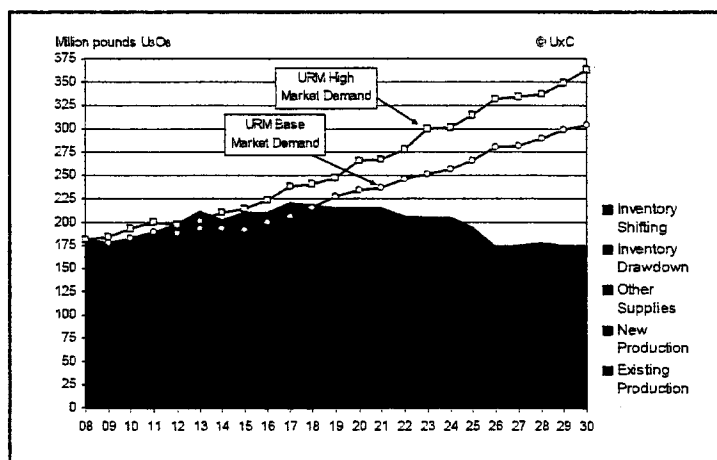
- 436 operating nuclear reactors in 30 countries
 - 104 reactors in the U.S. generating 20% of the electricity
- 44 reactors under construction
- 29 applications for new reactors in the U.S.
- 14 new countries expected to go nuclear
- Nuclear power reduces carbon footprint & helps eliminate greenhouse gases



MEETING THE CHALLENGE



Market Demand vs. Mid-Case Production Sources, 2008 – 2030



Source: Uranium Market Outlook, Q1 2009, Ux Consulting Company

MEETING THE CHALLENGE



2004 to 2008 Activities

- Radioactive Materials License
- Groundwater Discharge Permit
- Management and Sampling Plans
- Alternate Feed License Amendment
- Licensing of a new Tailings Cell

MEETING THE CHALLENGE



Current Activities

- Chloroform Corrective Action Plan
- Cell 4B License Amendment and Permitting
- License Renewal Application
- GWDP Amendments

MEETING THE CHALLENGE

- V. Radioactive Waste (Board Information Item)**
 - a. Response to Board Questions Regarding a Moratorium
On Depleted Uranium (DU) Disposal**

OFFICE OF THE ATTORNEY GENERAL, STATE OF UTAH
MEMORANDUM

TO: Radiation Control Board

FROM: Laura Lockhart
Assistant Attorney General

DATE: June 3, 2009

RE: Options for moratorium for depleted uranium

You requested that I report to you at the June 9 Board meeting about options for imposing a moratorium on land disposal of depleted uranium in Utah. I have prepared the attached proposals for your consideration.

The rule described in Part 1 of the attached handout would directly impose a moratorium. The rule described in Part 2 approaches the matter instead through the land ownership and control requirement in DRC's rules at R313-25-9. It will be helpful for Board members to know, before reviewing this option, that a previous board granted EnergySolutions an exemption from the land ownership and control requirements.

If the Board determines that it is interested in pursuing this matter, I would recommend that it approve both proposals for rulemaking so that it can receive comments on both before it makes its final determination. I would further recommend that the proposals be made separately to avoid any unnecessary delay in the rules' final implementation.

If the Board would prefer to recommend legislative action, either of these approaches could be modified for that purpose.

I will be prepared to speak to both of these options on June 9.

The NRC staff's report about "whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55(a)(6) or the section 61.55(a) waste classification tables" is the document that I found to be most directly pertinent to this matter. That document may be found at:

<http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2008/secy2008-0147/2008-0147scy.pdf>

The Nuclear Regulatory Commission selected the Staff's second option from that paper in a later decision. See http://hps.org/govrelations/documents/nrc_srm_secy-08-0147.pdf.

DEPLETED URANIUM - OPTIONS FOR REGULATION

1. PROPOSED RULE IMPOSING MORATORIUM

a. Possible language:

R313-71-1. Definitions.

For purposes of this Section R313-71:

“Incidental depleted uranium” means depleted uranium in concentrations of less than [#]% contained in other waste streams.

R313-71-2. Moratorium on land disposal of depleted uranium

- (a) No facility licensed for land disposal of radioactive waste may dispose of depleted uranium.
- (b) This prohibition does not apply to:
 - (i) small amounts of incidental depleted uranium contained within other waste streams, which collectively total less than [#] metric tons annually;
 - (ii) waste received by a facility for disposal before the effective date of this Section R313-72, provided the contract to dispose of the waste is dated before [DATE].
- (c) This prohibition shall expire on the earlier of the following dates:
 - (i) 180 days after the effective date of the rule promulgated by the federal Nuclear Regulatory Commission regarding disposal of depleted uranium, as anticipated in the March 18, 2009 instruction from the Commission to NRC staff entitled “Staff Requirements – SECY-08-0147 – Response to Commission Order CLI-05-20 Regarding Depleted Uranium;” or
 - (ii) January 1, 2013.

Other exemptions to consider:

- Waste streams the land disposal facility has a contract to dispose of if the contract is dated [before May 13, 2009] [before the effective date of this Section R313-71].

b. Authority for rule:

Utah Code Ann. § 19-3-104. Registration and licensing of radiation sources by department - Assessment of fees - Rulemaking authority and procedure - Siting criteria.

(4) The board may make rules:

(a) necessary for controlling exposure to sources of radiation that constitute a significant health hazard

c. Applicability of Utah Code Ann. §§ 19-3-104(8) and (9).

Compliance with Utah Code Ann. §§ 19-3-104(8) and (9) would be required. Those provisions limit the authority of the Board to make rules:

(8) (a) Except as provided in Subsection (9), the board may not adopt rules, for the purpose of the state assuming responsibilities from the United States Nuclear Regulatory Commission with respect to regulation of sources of ionizing radiation, that are more stringent than the corresponding federal regulations which address the same circumstances.

(b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

(9) (a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection (8) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are not adequate to protect public health and the environment of the state.

d. Questions the Board should consider as it determines whether to adopt this rule:

1. What is the evidence that corresponding federal regulations either are or are not adequate to protect public health and the environment?
2. If there is evidence that federal regulations are not adequate to protect public health and the environment, do we know the quantities of depleted uranium that may be land disposed without raising those concerns?
3. In the absence of a moratorium, what quantities of depleted uranium would be disposed of before the NRC completes its rulemaking process and we are able to complete ours?

2. EFFECTIVENESS OF WAIVER RULE

a. Background:

- (i) DRC rules require that a land disposal facility have evidence that a federal or state agency either own the property or will own it after closure.

R313-25-9. Institutional Information.

The institutional information submitted by the applicant shall include:

- (1) *A certification by the federal or state agency which owns the disposal site that the agency is prepared to accept transfer of the license when the provisions of R313-25-16 are met and will assume responsibility for institutional control after site closure and for post-closure observation and maintenance.*
 - (2) *Evidence, if the proposed disposal site is on land not owned by the federal or a state government, that arrangements have been made for assumption of ownership in fee by the federal or a state agency.*
- (ii) EnergySolutions, through its predecessor Envirocare, received waivers from the land ownership/control requirement based on the other controls that were provided. The waivers were granted under this section of the General Provisions:

R313-12-55. Exemptions.

- (1) *The Board may, upon application or upon its own initiative, grant exemptions or exceptions from the requirements of these rules as it determines are authorized by law and will not result in undue hazard to public health and safety or the environment.*

b. Possible language:

R313-71-3. Limitation on Exemptions from the Requirements of R313-25-9.

- (1) No facility licensed for land disposal of radioactive waste may dispose of depleted uranium unless it demonstrated compliance with the requirements of R313-25-9 during the licensing process.
- (2) The requirements of R313-71-3(1) may not be waived under the authority of R313-12-55, except by a specific order from this Board that cites this Section R313-71-3.
- (3) A facility that has not been required to meet the requirements of R313-25-9 because it has received an exemption from the requirements of that provision has not demonstrated compliance with the requirements of that provision for purposes of paragraph R313-71-3(1).
- (4) The prohibition specified in R313-71-3(1) does not apply to:
 - (i) small amounts of incidental depleted uranium which collectively total less than [#] metric tons annually; or
 - (ii) waste received by a facility for disposal before the effective date of this Section R313-71, provided the contract to dispose of the waste is dated before [May 13, 2009].

Other exemptions to consider:

- waste streams the land disposal facility has a contract to dispose of if the contract is dated [before May 13, 2009] [before the effective date of this Section R313-71].

c. Authority for rule:

See authority for rulemaking cited under Part 1.b above.

d. Applicability of Utah Code Ann. §§ 19-3-104(8) and (9).

Land ownership/control requirements are specified in federal rules (10 C.F.R. § 61.14). For that reason, no analysis under these provisions would be required.

e. Questions the Board should consider as it determines whether to adopt this rule:

1. What is the basis for having different approaches to exemption from the land ownership/control requirements of R315-25-9 for different wastes?
2. What is the basis for having the rule apply immediately?

V. Radioactive Waste

- a. Presentation by Laura Lockhart: Utah Code Annotated
§ 19-3-104(8)
“No More Stringent” Rule (**Board Information Item**)

**OFFICE OF THE ATTORNEY GENERAL, STATE OF UTAH
MEMORANDUM**

TO: Radiation Control Board

FROM: Laura Lockhart

DATE: July 7, 2009

RE: Request for additional information about the statutory provisions governing the stringency of DRC rules

The handout used for the June Board meeting will also be used to discuss the statutory provisions governing the stringency of DRC rules. A copy is included again for your convenience. See Part 1.c for the text of those statutory provisions.

DEPLETED URANIUM - OPTIONS FOR REGULATION

1. PROPOSED RULE IMPOSING MORATORIUM

a. Possible language:

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c. Applicability of Utah Code Ann. §§ 19-3-104(8) and (9).

Compliance with Utah Code Ann. §§ 19-3-104(8) and (9) would be required. Those provisions limit the authority of the Board to make rules:

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emorandum to Radiation Control Board
July 7, 2009
Page 3

purpose of the state assuming responsibilities from the United States Nuclear Regulatory Commission with respect to regulation of sources of ionizing radiation, that are more stringent than the corresponding federal regulations which address the same circumstances. (b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

(9) (a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection (8) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are not adequate to protect public health and the environment of the state.

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2. If there is evidence that federal regulations are not adequate to protect public health and the environment, do we know the quantities of depleted uranium that may be land disposed without raising those concerns?
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The institutional information submitted by the applicant shall include:

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- (2) Evidence, if the proposed disposal site is on land not owned by the federal or a state government, that arrangements have been made for assumption of ownership in fee by the federal or a state agency.*

- (ii) EnergySolutions, through its predecessor Envirocare, received waivers from the land ownership/control requirement based on the other controls that were provided. The waivers were granted under this section of the General Provisions:

R313-12-55. Exemptions.

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b. Possible language:

R313-71-3. Limitation on Exemptions from the Requirements of R313-25-9.

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e. Questions the Board should consider as it determines whether to adopt this rule:

1. What is the basis for having different approaches to exemption from the land ownership/control requirements of R315-25-9 for different wastes?
2. What is the basis for having the rule apply immediately?

- V. Radioactive Waste
 - b. Presentations by **HEAL-Utah**, and *EnergySolutions*, LLC “Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste”
(Board Action Item)

Depleted Uranium and Utah

Presentation to Utah Radiation Control Board
July 14, 2009

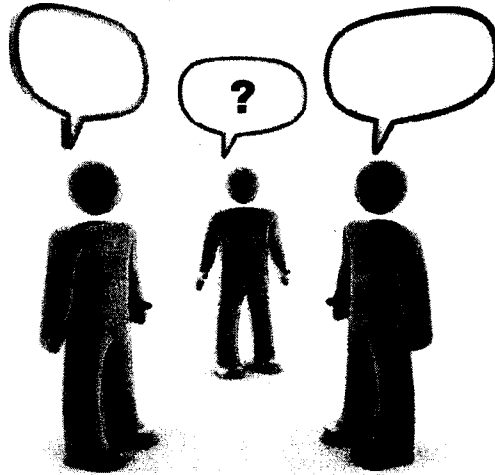
Christopher Thomas
Policy Director
HEAL Utah



DEPLETED URANIUM AND UTAH

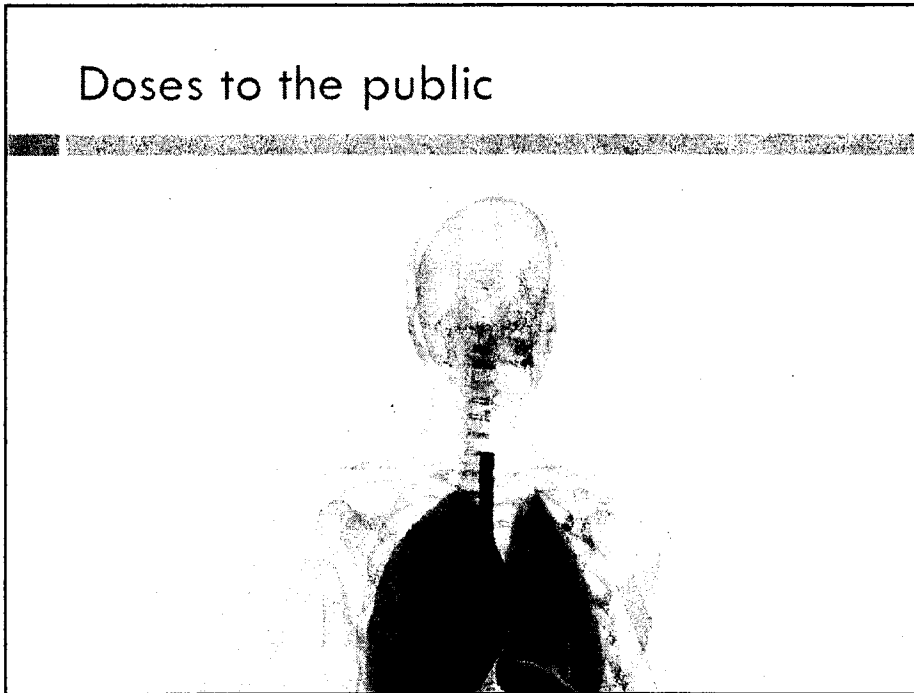
Health and Safety Considerations

Part 1. Is it safe?



We're here today to talk about whether or not the disposal of large amounts of depleted uranium can be considered safe.

Doses to the public



When we talk about keeping the public safe from radiation, what we're talking about is protecting people from receiving radioactive doses. That dose limit is described in Utah's administrative rules.

Protecting the public – 25 mrem

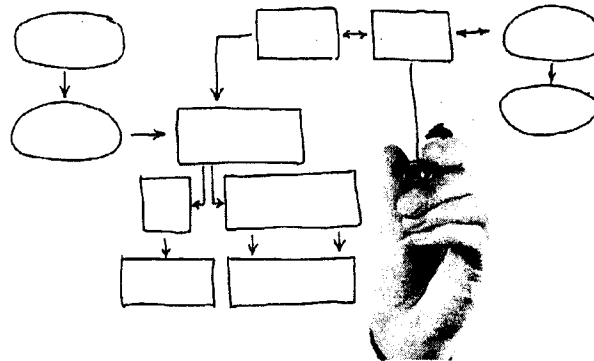
Concentrations of radioactive material ... shall not result in an annual dose exceeding an equivalent of 0.25 mSv (0.025 rem) to the whole body, 0.75 mSv (0.075 rem) to the thyroid, and 0.25 mSv (0.025 rem) to any other organ of any member of the public

Source: R313-25-19. Protection of the General Population from Releases of Radioactivity.

Here is the rule that protects members of the public in Utah. It says that a person shall not receive more than .025 rems (or 25 millirems) of radiation in a given year.

Well, you might wonder how the state of Utah and companies like EnergySolutions ensure that this limit of 25 mrem per year will not be exceeded.

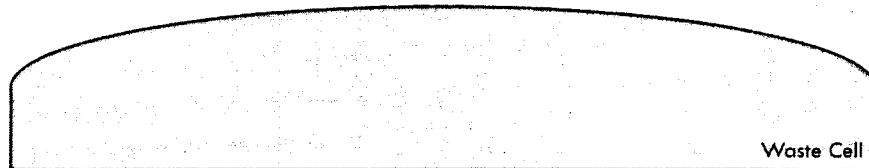
Modeling and exposure pathways



Will dose limits be exceeded?

EnergySolutions and the state of Utah use computer modeling to determine if the dose limit will be exceeded.

EnergySolutions: "It's safe!"



"Site-specific performance modeling for uranium disposal at the EnergySolutions site has demonstrated that natural uranium can be safely placed in the disposal cells, even when the waste is assumed to only consist of uranium." (Schramke 2007)

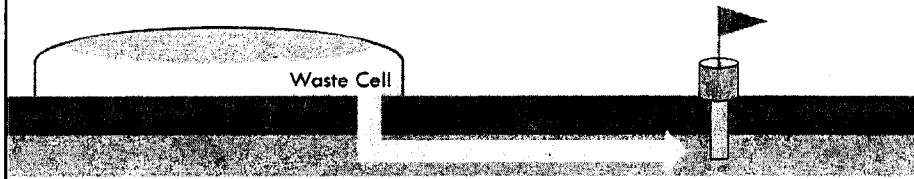
When HEAL Utah submitted comments in 2007 to the DRC on this issue of depleted uranium disposal, EnergySolutions commissioned a memo from Dr. Janet Schramke. In it, she wrote, "Site-specific performance modeling for uranium disposal at the EnergySolutions site has demonstrated that natural uranium can be safely placed in the disposal cells, even when the waste is assumed to only consist of uranium." She went on to write "These calculations provide an extreme upper limit on the risks of uranium disposal at the *EnergySolutions* site..."

This same claim has been made to the NRC and this Board.

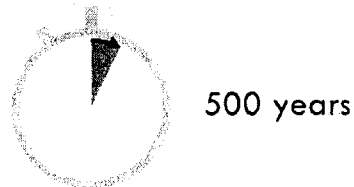
As evidence, Schramke cites a report by Whetstone Associates from 2000. So I looked at the Whetstone evaluation to see how it was conducted.

EnergySolutions: Assumptions

1. Off-site exposure pathway

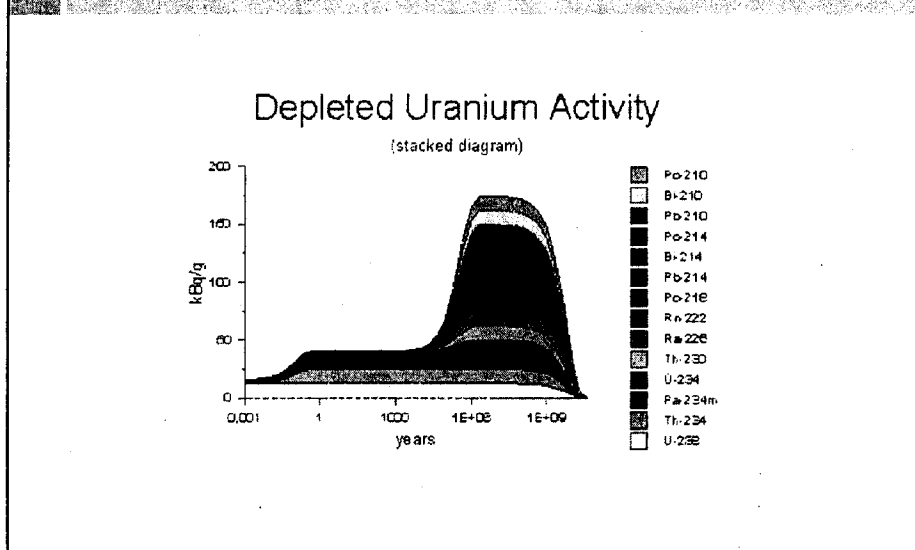


2. Performance period assessed



It's informative to look at the assumptions used in the Whetstone report for EnergySolutions ... the first is that the only long-term impacts modeled were compliance at groundwater wells. In other words, impacts to on-site individuals were not assessed. EnergySolutions appears not to have assessed long-term impacts to on-site individuals since at least 1996. Secondly, the performance period examined was only 500 years, as has been discussed previously. Are these the best assumptions to use when evaluation the hazard posed by depleted uranium?

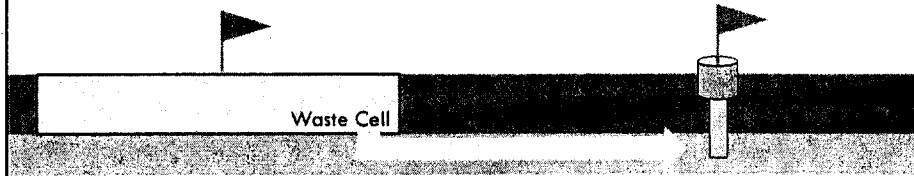
DU increases in radioactivity for thousands of years



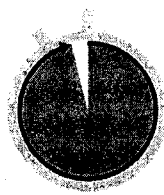
Well, as we know, depleted uranium increases in radioactivity for thousands and hundreds of thousands of years and doesn't reach peak hazard for 1 million years. Clearly, this has drastic implications for measuring the hazard from depleted uranium. Some hazardous constituents, like Radium-226 and Radon gas, don't even appear for thousands of years. So let's compare the assumptions used in the recent Nuclear Regulatory Commission analysis to what the EnergySolutions report uses.

NRC: Assumptions

1. Off-site AND on-site exposure pathways



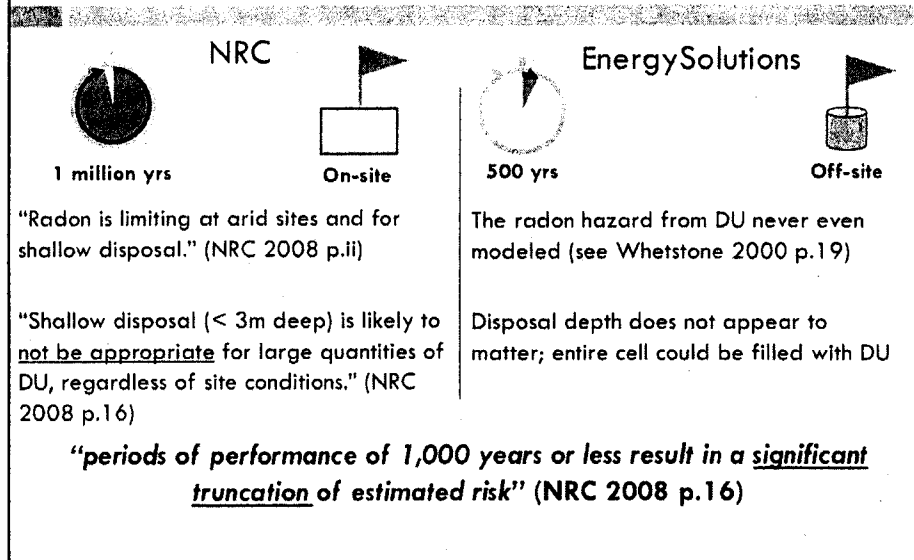
2. Performance period assessed



1,000,000 years

The NRC conducted its evaluation over 1 million years and also assessed the long-term dose impacts to off-site individuals AS WELL AS on-site individuals.

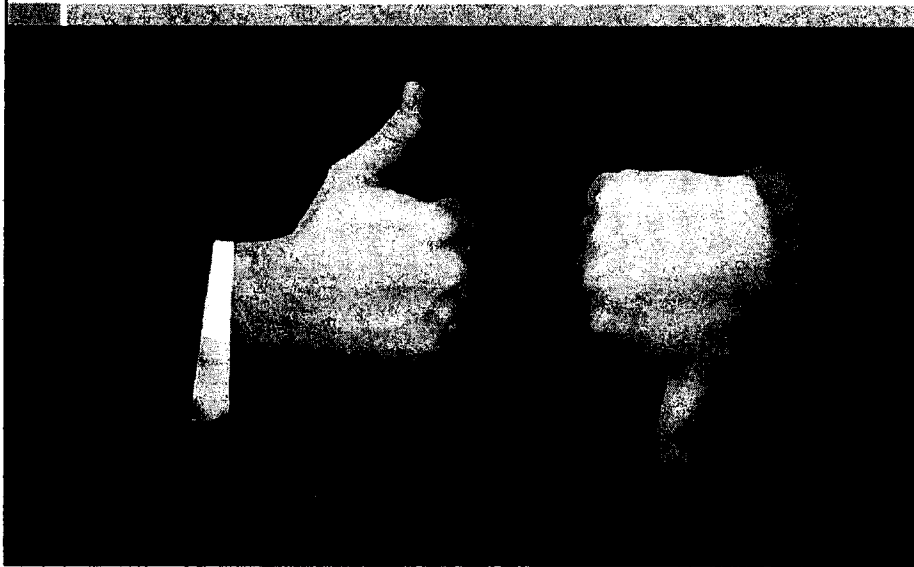
Different assumptions ... and results



Not surprisingly, the two studies, using vastly different starting assumptions, arrive at vastly different conclusions. For instance, the NRC study says that radon gas from depleted uranium is the limiting hazard at arid sites, whereas EnergySolutions' analysis didn't even model the radon emanating from DU—due to the short performance period studied.

Similarly, the NRC analysis found that shallow disposal was likely to "not be appropriate ... regardless of site conditions," whereas EnergySolutions' analysis implied the entire cells could be filled with DU. The bottom line, as expressed by the NRC, is that "periods of performance of 1,000 years or less results in a significant truncation of estimated risk." For this reason alone, EnergySolutions' modeling does not appear to be adequate to protect public health and safety.

What does the NRC study mean?



So at the end of the day, what does the NRC study really mean? It means that if you want to dispose of depleted uranium in a near-surface disposal facility, and you're concerned about public health effects, the local site conditions make a huge difference in whether the public is protected or not. This is true for both arid sites, like EnergySolutions, and humid sites, like you would find out East. Now, EnergySolutions tried to frame the NRC study as justifying their Clive site as acceptable for DU disposal. When I was discussing this with a senior systems performance analyst at the NRC, here's what he said:

"Our analysis is not to be used to justify a particular site or action; each site needs to be justified on its own merits. A range of results is possible, strongly site-specific. So if you want to make a decision on a particular site, you need to do that analysis on that site." [Dr. David Esh, Senior Systems Performance Analyst.]

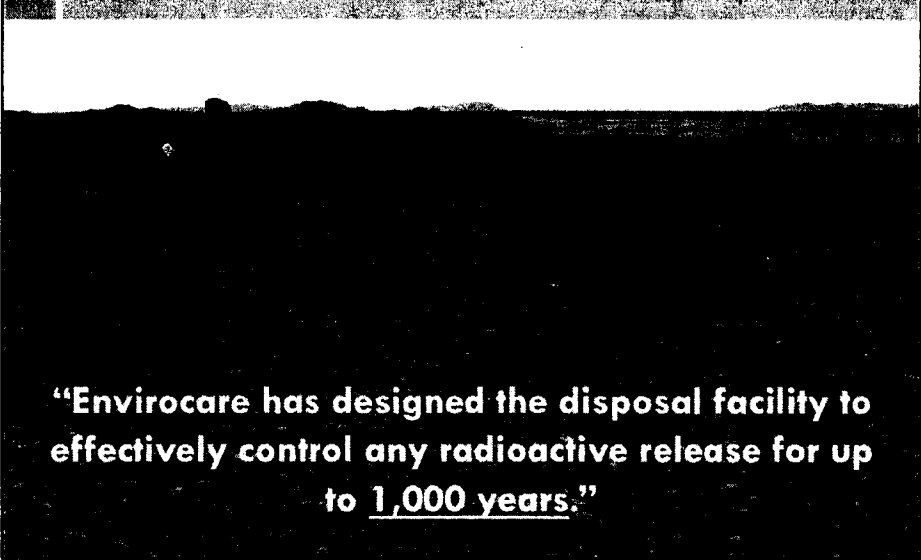
Far from justifying EnergySolutions as a safe site for bulk DU disposal, it points out the need to conduct a site-specific analysis to ensure protection of the public.

Part 2. Concern for long-term impacts



Now I want to talk a little bit about long-term impacts, because I know this Board is struggling with how to treat impacts that could occur thousands of years in the future.

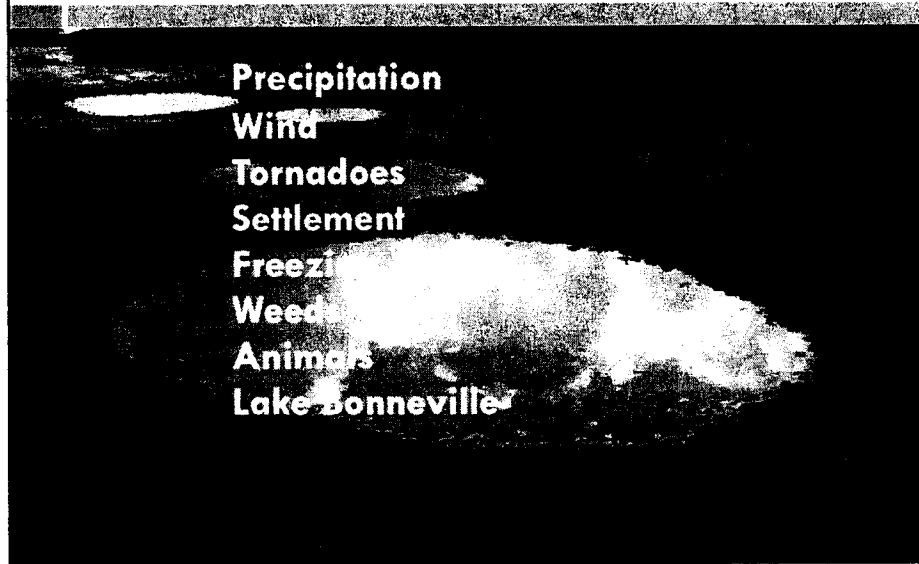
What could go wrong?



“Envirocare has designed the disposal facility to effectively control any radioactive release for up to 1,000 years.”

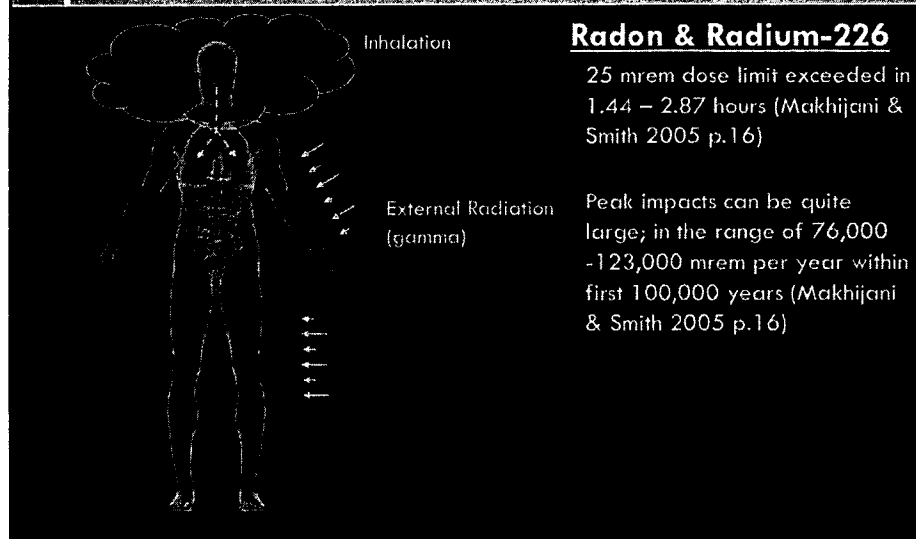
First of all, although the EnergySolutions site is designed to mitigate erosion, it's important to remember—by the company's own admission—the facility was designed to control radioactive releases for “up to 1,000 years.” A hazard that will last a million years or more seems inappropriate for a site designed only for 1,000 years.

What could go wrong?



Even though the site may look impermeable at closure, consider how the site could change over a million years and more. During that time, the site will have to weather many destructive forces, including precipitation, wind, tornadoes, differential settlement, freezing and thawing, the return of Lake Bonneville, weeds, animals

Erosion and long-term impacts



If you assume that, for whatever reason, the protective coverings eventually erode, you can calculate very high impacts to on-site intruders. Makhijani and Smith calculated that – only considering inhalation and external doses – someone could receive more than the annual limit of 25 mrem in only a couple of hours. Under certain scenarios, on-site intruders could receive hundreds of thousands of millirems of radiation per year – far in excess of the 25 mrem required by regulation

Inadvertent intruders

Design, operation, and closure of the land disposal facility shall ensure protection of any individuals inadvertently intruding into the disposal site and occupying the site or contacting the waste after active institutional controls over the disposal site are removed.

R313-25-20. Protection of individuals from inadvertent intrusion.

Now, you might say that you don't want to consider inadvertent intruders onto the site – because you think it's an unlikely scenario or because you think things like fences and guards will keep them out. But Utah regulations require protection of inadvertent intruders. Furthermore, things like fences or people guarding the site can only be relied on for 100 years after site closure.

(“institutional controls may not be relied upon for more than 100 years following transfer of control of the disposal site to the owner”) **R313-25-28. Institutional Requirements.**

What could go wrong?



Furthermore, when we talk about geologic processes affecting the site—like long-term erosion or the potential return of Lake Bonneville—there are some who say that the large uncertainty around such processes means we can essentially ignore them.

Utah rules require “defensible modeling”

Areas shall be avoided where surface geologic processes such as mass wasting, erosion, slumping, landsliding, or weathering occur with sufficient such frequency and extent to significantly affect the ability of the disposal site to meet the performance objectives of R313-25, or may preclude defensible modeling and prediction of long-term impacts.

R313-25-23. Disposal Site Suitability Requirements for Land Disposal - Near-Surface Disposal.

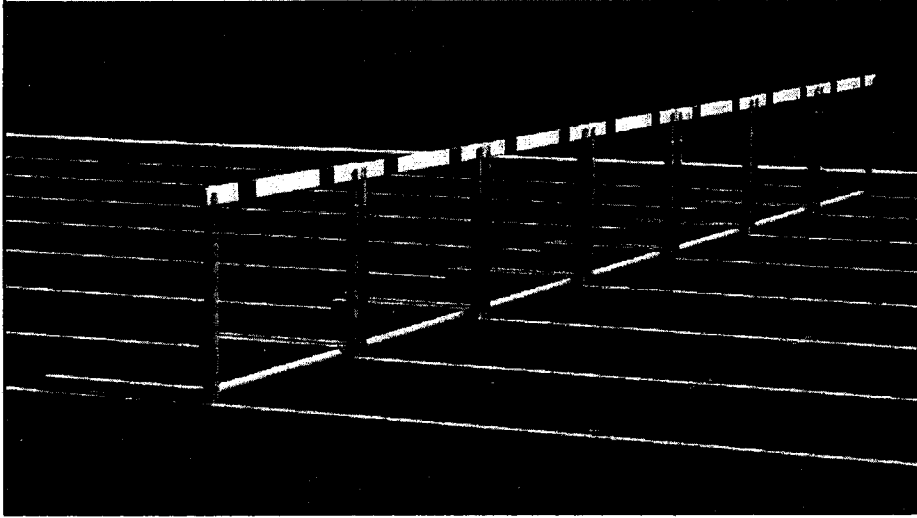
But fortunately (or unfortunately) for us, I don't believe Utah's radiation rules let us off the hook that easily.

Utah regulations say that sites should be avoided in situations where geologic processes may “preclude defensible modeling and prediction of long-term impacts.”

Before, when we thought we were dealing with a 100-year hazard, maybe we didn't need to worry about 1 million years of erosion and the potential return of Lake Bonneville. But when you start dealing with a hazard that can be measured in geologic time, our rules require us to avoid disposal in areas subject to geologic processes that could expose the public to that hazard.

I don't think this Board has the luxury of deciding whether to care about the long-term; in this instance, I think the law of the land requires it.

Part 3. The hurdles of rule-making



Finally, I want to address what would be required should the Board decide to go down the road of initiating a rule-making to put a moratorium on the disposal of depleted uranium.

Rule 1 – Temporary moratorium



No DU until 180 days after NRC rulemaking
is effective or January 1, 2013

Now, in order to pass a temporary moratorium on DU disposal, as described by the Attorney General's office in Rule 1, the Board would have to meet the state's "stringency test." What does this mean? It means that in order to pass this moratorium, the Board would need to make a finding that "corresponding federal regulations are not adequate to protect public health and the environment of the state." What would that look like?

Justifying the moratorium

It is the large quantities and higher concentration of DU that create a potential health and safety concern, and staff believes that the goal of any changes to Part 61 should be to provide a means to ensure additional disposal considerations are taken for DU, based on the quantity of material at issue.

NRC 2008 p.7

Well, thankfully, the Nuclear Regulatory Commission has already provided us the justification we need. In fact, the NRC has both admitted that the existing analysis does not cover the disposal of large quantities of depleted uranium, AND has determined based upon its own analysis that different sites may or may not be able to dispose of depleted uranium safely, as we saw earlier. That's precisely why—based on health and safety concerns—the NRC has decided to require a site-specific analysis before large quantities of DU are disposed. Therefore, a justification that federal rules are inadequate to protect public health and safety for rule 1 seems fairly straightforward.

Rule 2 – Waiver required



No DU until Board gives waiver or long-term site ownership determined

Now, you may remember that the handout from the AG's office had a second rule for you to consider, that would be promulgated in conjunction with the first.

Let's take a look at this.

Federal rules require ownership

Land ownership. Disposal of radioactive waste received from other persons may be permitted only on land owned in fee by the Federal or a State government.

§ 61.59(a), institutional requirements.

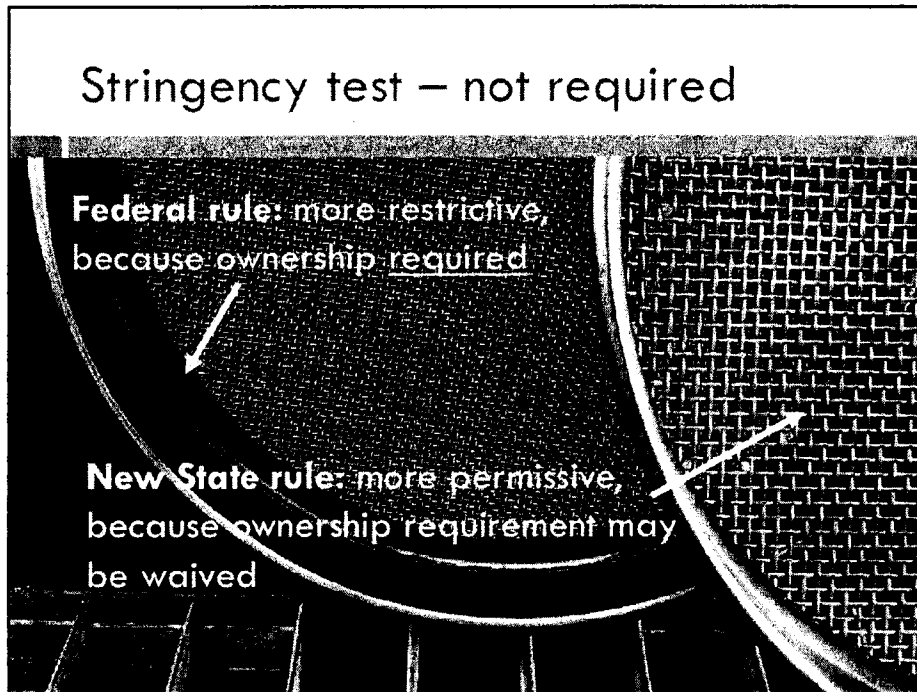
You may not know it, but both Federal and state rules require that, for privately-owned facilities like EnergySolutions, the company must provide evidence that arrangements have been made for a state or federal agency to eventually assume ownership of the site.

First Envirocare, and now EnergySolutions, has never been able to make this required arrangement. Therefore, as the company has expanded its license to take more and hotter wastes, it has had to secure waivers or exemptions to this requirements from this very Board.

In fact, when it sought and obtained a license to accept B and C wastes, DEQ suggested legislation that would have required the state of Utah to become the site owner. That legislation failed, presumably because the state legislature didn't want to take on that kind of liability.

Envirocare also approached the Department of Energy about becoming the long-term site owner. DOE responded that it could only accept ownership after the post-closure period had elapsed ... in other words, only 100 years after the site had closed.

The new proposed rule would simply say that, before disposing of large quantities of depleted uranium, this Board would have to issue another waiver to EnergySolutions to exempt it from the land ownership requirement.



When thinking about stringency, I find it helpful to think of it like a sieve. A more stringent rule is like a tighter sieve – it's more restrictive.

Well, in the case of land ownership requirements, the Federal rule is actually more restrictive than the proposed state rule. The Federal rule requires site ownership, period.

The new state rule would simply require an additional waiver for disposal of large quantities of depleted uranium – still more permissive than the Federal rule, because it allows the ownership requirement to be waived at the Board's discretion.

This would simply extend the historical practice of requiring an additional waiver when longer-lived hazards are sought. The state required an additional waiver be obtained back in 1999/2000 when Envirocare sought a license for B and C waste disposal, and the NRC concurred.

Prior waivers should not be considered to cover large amounts of depleted uranium, because the long-term hazards had not been studied or acknowledged, and Class A wastes were historically thought to decay away within 100 years to a level that posed an "acceptable hazard" to on-site intruders. See 10 CFR § 61.7. Concepts.

Therefore, in order to pass the second rule, the Board would not have to make a finding that Federal rules are not protective of human health and the environment.

- V. Radioactive Waste
 - b. Presentations by HEAL-Utah, and **EnergySolutions, LLC** "Moratorium On Disposal of Depleted Uranium Low-Level Radioactive Waste"
(Board Action Item)

Disposal of Depleted Uranium at *ENERGYSOLUTIONS*' Clive Facility

July 14, 2009

Presentation to the State of Utah, Radiation Control Board

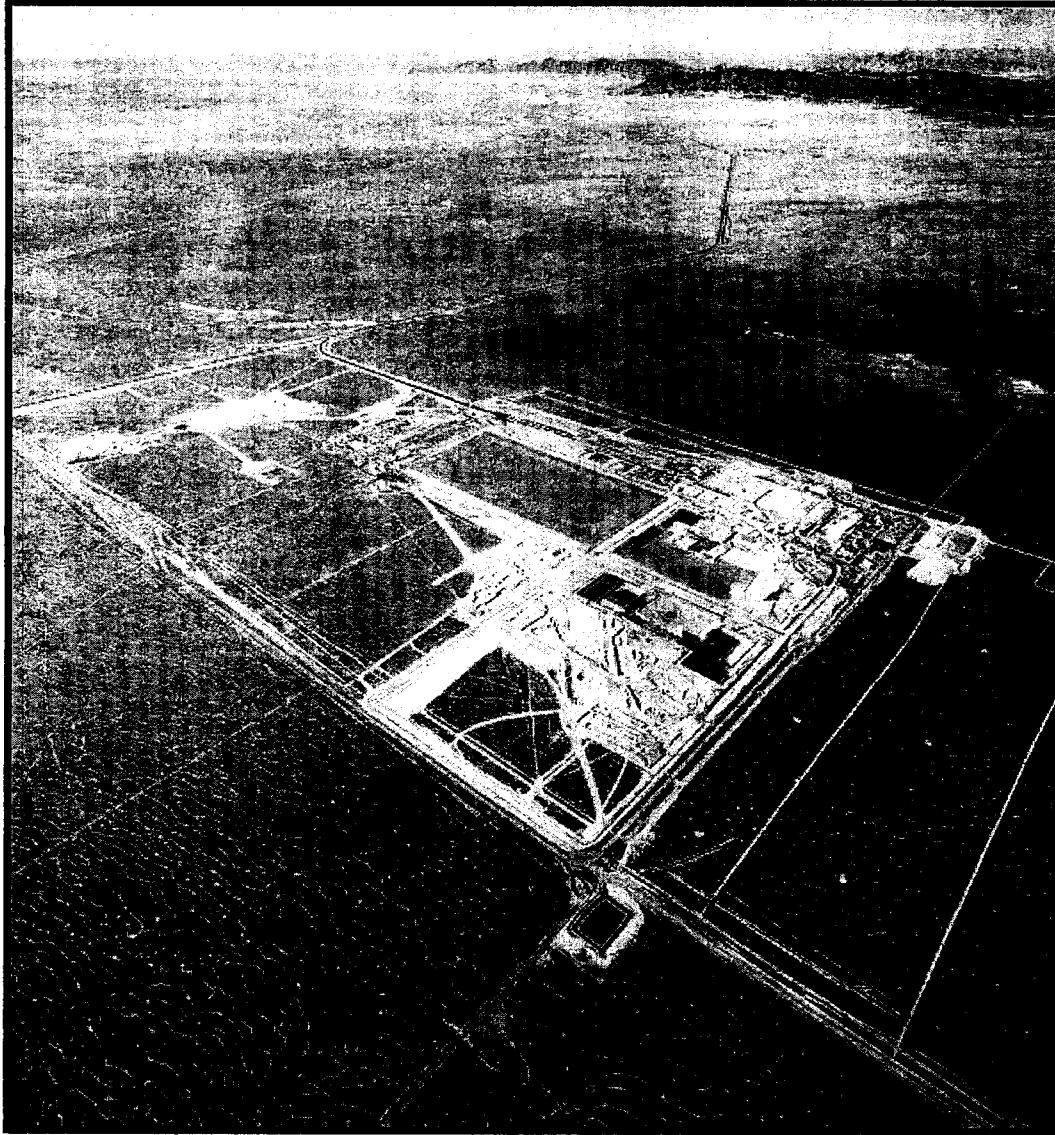
Thomas E. Magette, P.E.

Daniel B. Shrum, P.G.



The Clive site is safe for DU disposal

- The Clive site is safe
 - Sited and managed to provide long term protection
 - Ideally suited for disposal of depleted uranium
- Depleted Uranium is properly classified as Class A LLW
 - NRC decision based on extensive analysis
 - Performance objectives protect health and safety
 - NRC has not prohibited DU disposal
- There is no need for a moratorium



The Clive Site is Safe

- Remote location
 - 7 miles to nearest resident
 - 35 miles to nearest population center
- Arid Climate
 - Low precipitation
 - High evaporation
- Naturally poor aquifer
- Low erosion potential
- Site thoroughly analyzed for disposal of LLW and Mill Tailings
- Located in Tooele County Hazardous Materials Corridor
- Abundance of natural embankment construction materials
 - Clay
 - Sand
 - Rock



Site Suitability

- Clive has been thoroughly evaluated and proven to be an excellent site for LLW and uranium/thorium mill tailing disposal
- Protection for extended time period has been addressed
 - Site inhospitable to human habitation
 - Inherently protective against intruder scenarios
 - Utah DRC conclusion¹
 - “...unrealistic to assume residential or agricultural intruders.”
 - From the Nuclear Regulatory Commission’s Order¹
 - “...significant intruder exposures at a site like Envirocare are unrealistic.”
 - “...could be licensed under 10 CFR 61 regardless of the time frame you looked at.”
 - “...any projections about the likelihood of an intruder scenario would be exceedingly speculative.”

Site Suitability

- NRC Staff stated these conclusions in adjudicated proceeding
 - “...it is reasonable to assume there will not be radiological exposures involving residents or farmers drinking contaminated water obtained from the site and eating foods irrigated by the site’s water and grown in the site’s soil.”¹
- Staff conclusion concurred by
 - Atomic Safety Licensing Board
 - U.S. Nuclear Regulatory Commission
 - Utah Division of Radiation Control

¹Memorandum and Order in the Matter of Louisiana Energy Services, L.P., CLI-06-15, June 2, 2006.

Response to Specific Board Questions

Board Questions

1. Do you anticipate the NRC rule-making process to result in significant changes to the DU acceptance and performance criteria for the *EnergySolutions* site? Explain how anticipated changes may/may not affect health and safety concerns.
 - A. It is not anticipated that the NRC rulemaking process will result in significant changes to the DU acceptance and performance criteria at Clive.

Scope of NRC Rulemaking

- Purpose of rulemaking
 - Require site-specific analysis for the disposal of large quantities of DU
 - Establish technical requirements for such an analysis
 - Develop guidance document that outlines the parameters and assumptions to be used in conducting site-specific analyses
- Conduct a public workshop inviting all potentially affected stakeholders
 - Issues associated with the disposal of depleted uranium
 - Potential issues to be considered in rulemaking
 - Technical parameters of concern in the analysis
 - “...so that informed decisions can be made in the interim period until the rulemaking is final.”²
- “...the Commission is not proposing to alter the waste classification of depleted uranium.”²

²Staff Requirements – SECY-08-0147 – Response to Commission Order CLI-05-20 Regarding Depleted Uranium, March 18, 2009

Current Classification

- There is no “hole in the regulations”
- Depleted Uranium is Class A LLW
- Reference to deletion of uranium from the draft tables irrelevant and misleading
- Consciously removed from Part 61.55 tables before regulations enacted
- DU properly classified – affirmed by the Nuclear Regulatory Commission in 2005, 2008, and again this year
- Reclassification of DU *not* under consideration

Site-Specific Performance Assessment

- Reliance on site-specific performance assessment
 - Sound science
 - Emphasizes risk-informed decision making
 - Protects the people and environment of Utah
 - Most effective measure of suitability for shallow land burial
- Performance Assessment not a new requirement
 - Builds on existing NRC requirements
 - Assessment already required to satisfy performance objectives
 - Applies to release of all radioactive material, not just isotopes listed in waste classification tables
 - Regulations include dose standards to protect people and the environment

Anticipated Changes

- Result of NRC rulemaking at Clive
 - Disposal of DU from enrichment will continue to be acceptable
 - May be changes necessary to meet performance objectives
 - Performance modeling of greater time periods
 - Possibility of minimum disposal depth requirement
- Changes to disposal methods not significant

Board Questions

2. **Would the acceptance, under the current regulatory framework, of large quantity DU waste between now and the time the NRC issues its ruling pose a health and safety risk to the people and environment of Utah? If so, how? If not, why not?**
 - A. **The acceptance of DU waste between now and the time the NRC issues its ruling will *not* pose a health and safety risk to the people and environment of Utah; moreover, the volumes of DU available for disposal in that time period are much lower than the Board has been led to believe.**

700,000 metric tons not coming to Clive in 2 years

- Large quantities of DU *not* available for disposal in next 2 years
- 46,000 metric tons – maximum available for disposal *anywhere* over next 5 years
 - Includes waste from deconversion
 - Includes material from Savannah River
 - Consistent with past waste streams.
- 700,000 metric tons total DOE inventory
 - To be disposed or sold over next 25-30 years
 - Waste requires deconversion prior to disposal – DUF_6 to U_3O_8
 - Deconversion facilities constructed but not yet operational
 - DOE's own estimate – less than 46,000 metric tons in next 5 years
- Continued acceptance of DU is safe

Board Questions

3. How would the implementation of a temporary moratorium affect the answers given above?

A. The implementation of a temporary moratorium does not alter the facts:

- **Clive is safe for the disposal of depleted uranium**
- **The quantities of DU that could be disposed of in the next two years has been greatly exaggerated**
- **The NRC is effectively addressing the issue**

Imposition of a Moratorium

- Board could impose a moratorium only via rulemaking
- There are no Federal restrictions on DU disposal
- State law requires that a moratorium meet “no more stringent” provision
 - “...written finding after public comment and hearing and *based on evidence in the record* that corresponding federal regulations are not adequate to protect public health and the environment of the state.”
- NRC has carefully and recently reviewed basis for their regulations
 - Includes > 6 years of recent study and new modeling
 - Litigated in adjudicatory proceeding (LES)
 - Affirmed by the Commission in multiple Orders

The Record that supports NRC conclusion

- Draft Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste, NUREG-0782, September 1981.
- Final Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste, NUREG-0945, November 1982.
- Final Rule, Licensing Requirements for Land Disposal of Radioactive Waste, Nuclear Regulatory Commission, 47 FR 57446, December 27, 1982.
- Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-term Management and Use of Depleted Uranium Hexafluoride, U. S. Department of Energy, DOE-/EIS-0269, April 1999
- LES Environmental Report, December 2003
- Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, NUREG-1790, September 2004
- Memorandum and Order in the Matter of Louisiana Energy Services, L.P., CLI-06-15, June 2, 2006
- Staff Requirements – SECY-08-0147 – Response to Commission Order CLI-05-20 Regarding Depleted Uranium, March 18, 2009
- Memorandum and Order in the Matter of Louisiana Energy Services, L.P., CLI-05-05, January 18, 2005
- Memorandum and Order in the Matter of Louisiana Energy Services, L.P., CLI-05-20, October 20, 2005
- Staff Requirements – SECY-08-0147 – Response to Commission Order CLI-05-20 Regarding Depleted Uranium, March 18, 2009
- 10 CFR 61
- Memorandum, M. Blevins to S. Flanders, Telephone Summary Regarding Depleted Uranium Disposal, April 6, 2005
- Transcript In the Matter of Louisiana Energy Services, L.P., National Enrichment Facility, Docket No. 70-3103-ML

NRC process is responsive

- Better approach is to rely on NRC rulemaking
- NRC workshops scheduled for September 2009 **in Utah**
- NRC process designed *so that informed decisions can be made in the interim period until the rulemaking is final*
- NRC has identified no technical basis to justify a moratorium

Board Questions

4. **Can the same results be accomplished by means other than a moratorium?**
 - A. ***EnergySolutions* suggests an alternate response to concerns regarding the interim disposal of depleted uranium that is both more effective and avoids a potential conflict between Board and NRC rules.**

EnergySolutions Commitment

- NRC technical analysis shows that large volumes DU can safely be disposed at arid sites provided the materials are buried a minimum of 3 meters (10 feet)
- EnergySolutions commits to
 - Burying all future shipments of DU from enrichment facilities a minimum of 10 feet below the top of cover
 - Accepting a formal license condition (could be completed in less than 60 days)
 - Implementing this commitment effective immediately
 - Ensuring that DU already disposed of meets all existing and future NRC requirements
- **Our proposal is consistent with how DU has been disposed of at Clive historically**
- A similar license condition currently exists in our uranium mill tailings license for wastes with higher concentrations of Th-230 and Ra-226

Proposed LLW License Condition

59) (currently reserved)

The Licensee shall place all wastes with depleted uranium concentrations greater than 5 percent (by weight) a minimum of 10 feet below the top of the cover. This license condition shall be removed following the completion of the Nuclear Regulatory Commission's rulemaking on Depleted Uranium and subsequent approval by the Division of the site specific performance assessment for the Clive facility.

Moratorium not needed to protect health and safety

- Clive has been proven to be a safe site for LLW disposal
- Inhospitable to human habitation now and for many generations
- Change to those conditions would be on a geologic time-scale
- NRC rulemaking process accommodates informed decision making in the interim
- Minimum DU from enrichment could be disposed of during that time period
- *EnergySolutions* is committed to enhanced disposal requirements via formal license amendment

Speakers

Speakers

- Daniel B. Shrum, P.G.
 - M.S. Hydrogeology, Brigham Young University, 1993
 - B.S. Engineering Geology, Brigham Young University, 1988
 - Professional Geologist – Utah, Wyoming, Tennessee
 - Mr. Shrum is the Senior Vice President of Regulatory Compliance and has been with *EnergySolutions* for 12 years. He is also responsible for the overall Corporate environmental culture, obtaining and updating *EnergySolutions* numerous permits and licenses, and ensuring that the regulations are followed at all facilities. He has over 19 years of professional experience including investigations and remedial actions at numerous CERCLA and RCRA sites in Utah, North Dakota, Alaska, and California. Mr. Shrum has designed and installed monitoring well compliance and groundwater extraction systems, and conducted and interpreted aquifer test data for many groundwater investigations. He has successfully managed field teams conducting site characterizations, remedial investigations, and treatability studies. He is experienced in all aspects of drilling and monitoring well completion methods, appropriate air, soil, and groundwater sampling protocol, and QA/QC procedures.

- Thomas E. Magette, P.E.
 - M.S., Nuclear Engineering, University of Tennessee, 1979
 - B.S., Nuclear Engineering, University of Tennessee, 1977
 - Professional Engineer – New Mexico, Virginia, Maryland
 - *EnergySolutions*' Senior Vice President for Nuclear Regulatory Strategy, Mr. Magette has over 30 years experience managing and conducting environmental assessment, siting, licensing, and nuclear safety programs for a wide variety of energy generation and transmission; defense; and radioactive waste disposal facilities. He has extensive experience in all phases of environmental compliance for energy facilities and has prepared and presented expert testimony in regulatory proceedings. Mr. Magette developed *EnergySolutions*' licensing strategy for License Stewardship approach to D&D, the first application of which was recently approved by the NRC for the Zion nuclear station. Mr. Magette has managed the preparation of NEPA analyses and documents for several highly controversial projects, including the siting and licensing of power plants, defense nuclear reactors, nuclear weapons manufacturing facilities, high-voltage transmission lines, natural gas distribution lines, and biosafety level IV facilities.

V. Radioactive Waste

- c. Requests to Board to Provide Comments on
Depleted Uranium Disposal
(Board Information Item)

1. Stephen T. Nelson, Ph.D.
2. Brian Moench, M.D.

Dane Finerfrock - Re: Radiation Control Board: follow-up

From: Steve Nelson <oxygen.isotope@gmail.com>
To: Dane Finerfrock <DFINERFROCK@utah.gov>
Date: 6/30/2009 12:33 PM
Subject: Re: Radiation Control Board: follow-up

Dane,

The idea that anyone could confuse DU with LLW is stunning to me.

Here's my outline:

- I. A brief review of the nature of DU
 - A. What it is
 - B. Where it comes from
 - C. Essential differences from LLW
- II. Existing regulatory philosophy
 - A. Control of "short-lived" [century-scale] wastes
 - B. Control of "long-lived" [millenium to 1 million years] wastes
 - C. Environmental ethics
- III. Suitability of ES Clive facility
 - A. As an engineered facility for short-lived wastes
 - B. As a disposal facility for long-lived wastes

Steve Nelson
Professor
Dept. of Geological Sciences
S-389 ESC
Brigham Young University
Provo, UT 84602

office/voice mail: 801-422-8688
lab: 801-422-7330

Jan. 20, 2009: The end of an error.

Disclaimer for the feeble-minded: It should be painfully obvious, but the identification of my affiliation with Brigham Young University does not imply that the University endorses any political or otherwise partisan content of this message.

V. Radioactive Waste

c. Requests to Board to Provide Comments on
Depleted Uranium Disposal
(Board Information Item)

1. Stephen T. Nelson, Ph.D.

2. Brian Moench, M.D.

From: <drmoench@yahoo.com>
To: <dfinerfrock@utah.gov>
Date: 6/29/2009 3:22 PM
Subject: EnergySolutions/Depleted Uranium
Attachments: DU:EnergySolutions outline.rtf

Dane:

Attached is an outline of the presentation the Utah Physicians for a Healthy Environment would like to make at the July meeting regarding the proposed moratorium on EnergySolutions storing more depleted uranium. Our presentation takes 18 minutes.

Sincerely,

Dr. Brian Moench
President, Utah Physicians for a Healthy Environment

Assumptions necessary to determine that storing DU at Clive is "safe"

1. The DU storage will have an extremely small likelihood of exposing the public
 - A. Integrity of the storage cylinders
 - B. Chemical stability of the contents
 - C. Possible effect of weather events, including global warming
 - D. Political or business effects on long term security of the Clive site.
 - E. Earthquake possibilities

2. If the public is exposed, the exposure will be likely be small. and that a low dose exposure of the public will have no, or negligible impact on public health
 - A. History of the nuclear industry, miscalculations, deceptions, fraud
 - B. What do the science experts say about low dose exposure?
 - C. What evidence is there that groups already exposed that have had health impacts?

3. Precautionary principle in medical practice

- VII Other Division Issues (**Board Information Item**)
 - a. Division Activities Report

Division of Radiation Control
Activities Report Summary

June, 2009

Violations Assigned a Severity Level I, II or III or where a Monetary Penalty has been proposed

1. Moab Testing Services, Moab, Utah; Severity Level III

Notice of Violation issued because portable nuclear gauges were observed to be stored in a shed with only one tangible barrier. By rule, the licensee is required to use a minimum of two independent physical controls to prevent unauthorized removal.

2nd Quarter, 2009

X-Ray Program

Current Registrations: 2538, an increase of four registrants since 1st quarter

Inspections conducted by staff: 135

Inspection conducted by Qualified Experts: 30

Radioactive Materials Program

Current Licenses: 196 representing 182 licensees, a decrease of one license

Radioactive Materials Inspections: 28

Five new licenses were issued, 11 licenses were renewed and 23 license amendment were completed.

Low-Level Radioactive Waste Program

Fourteen inspections were conducted at EnergySolutions in the following areas: 6-general radiation safety, 3-engineering inspections and 5-groundwater permit inspections.

Uranium Mill Program

Eight inspections were conducted at the uranium mills including four inspections at Denison Mines, three inspections at Uranium-One and one inspection at Rio Algom Uranium Mill (site closed)

Generator Site Access Permits

Four Hundred fourteen manifested shipments were inspected.

Moab Uranium Mill Tailings Clean-up

Contact: Connie S. Nakahara, DEQ,
801-366-0523

Date: June 18, 2009

Status

On April 20, 2009, the Department of Energy began shipping tailings from the Moab Uranium Mill site to the Crescent Junction disposal cell. Approximately 126 tons of tailings have been shipped by rail each week.¹ DOE anticipated shipping 160 tons of tailings per week. However, due to the need to minimize the amount of liquid separation during transport the moisture content in the tailings is limited. Consequently, the tailing shipments have been much lighter than originally predicted.² To increase the total mass disposed per week, DOE plans to utilize federal stimulus money and add an additional Sunday shift starting mid-June 2009.

DOE's Remedial Action Contractor - EnergySolutions is currently in the process of hiring an additional 90 to 100 employees. In August 2009, DOE plans to implement a second, three-day shift (Friday through Sunday). Federal stimulus money will fund the second shift. DOE expects to reduce the clean up schedule by 2.5 years by utilizing a second shift. If the Moab tailings project continues to receive the current funding, including the infusion from stimulus money, DOE estimates the clean up would be completed within 10 years which would allow DOE to meet the Congressionally imposed deadline of October 2019.

Currently, the number of trucks carrying tailings containers allowed to cross SR-279 each day (Potash Road) is restricted by the Utah Department of Transportation. Thus, the number of containers loaded on each train is limited to the number of haul trucks allowed to cross SR-279. DOE plans to use stimulus funds to construction an underpass under SR-279 in August 2009. Once the underpass is operational, the number of truck haul trips per day to the rail spur will not be limited by SR-279.

DOE and Union Pacific completed the upgrade of ten railroad crossings. The upgrades include lights and some railroad crossing arms. (Two upgrades are awaiting power sources.)

In a survey of the area, DOE previously identified Radioactive Residual Material (RRM) at a Moab business - Bert's Auto Salvage Yard. During June 2009, DOE plans to remove the radioactively contaminated mill piping and barrels from the site. In addition, as a service to the community, DOE also plans to remove a contaminated mine buggy and any large pieces of uranium ore. DOE plans to scan the remaining salvage vehicles and other metal to allow Bert's Auto to ship the clean metal to a smelter. After the yard is essentially clear DOE will survey the soil. The site has asbestos and battery acid leaks. However, DOE does not anticipate the generation of mixed waste. DOE hopes to start soil clean up in August, if necessary.

Monitoring worker exposure: As of May 21, 2009, the highest worker exposure was 20 mrem/30 days, based on 21 days of work, therefore, the dose was approximately 1 mrem/day or a calculated exposure of 210 mrem/yr. The average individual results were 13 mrem/30 days or approximately 0.62 mrem/day or 130 mrem/yr.

Using federal stimulus money, DOE also will provide Grand County with funds to hire an engineer to provide oversight over the clean up project.

¹ Monday through Thursday DOE ships 88 containers to Crescent Junction.

² The material in the tailings pile is a white hard material with 43 percent moisture.

Background

The 435-acre Moab Uranium Mill Tailings site is the former Atlas Mineral Corporation uranium facility.³ The site abuts the west bank of the Colorado River and the southern border of Arches National Park. Years of uranium processing left the groundwater beneath the site contaminated with ammonia, uranium, copper, manganese and sulfate. The 130-acre tailing pile continues to leach ammonia into the aquifer. The contaminated groundwater flows into the Colorado River, thus, the source of contamination - the tailings pile must be moved. Finally, in 2005, the State of Utah in concert with the Utah delegation and other Moab tailing stakeholders (Grand County, City of Moab, USGS, L.A. Power and Water, etc.) persuaded the DOE to issue a Record of Decision to move the tailings to Crescent Junction, Utah for disposal in an NRC approved disposal cell. Don Metzler is the DOE project manager for the Moab Tailings clean up.

In June 2007, DOE selected EnergySolutions Federal Services, Inc., of Oak Ridge, Tennessee as its remediation contractor.⁴ DOE also selected S&K Aerospace Inc.⁵ to provide technical and administrative support, including oversight on the design and disposal activities. In addition, S&K is responsible for groundwater monitoring and remediation at the Moab site.

As proposed by Congressman Matheson, PL 110-181, effective January 2008, mandates DOE complete the clean up of the Moab uranium mill tailings by October 1, 2019 instead of the DOE projected completion date of 2028.

In March 2009, DOE awarded \$108 million from the American Recovery and Reinvestment Act the clean up of the Moab Uranium Mill tailings.

On April 20, 2009, DOE began shipping tailings to the Crescent Junction disposal site.

³ Atlas Minerals Corporation ceased operation in 1984 and declared bankruptcy in 1989. In October 2001, title of the Moab tailings site transferred to DOE as authorized under Public Law 106-398 - the Floyd D. Spence National Defense Authorization Act for FY2001. Public Law 106-398 further mandated that cleanup occur in accordance with the Uranium Mill Tailings Radiation Control Act of 1978- Public Law 95-604 .

⁴ Teamed with EnergySolutions, Jacobs Engineering Group, Inc. will perform engineering design services; Envirocon, Inc. for removal of the tailings pile, and Neilson Construction for infrastructure construction support.

⁵ S&K is teamed with Professional Project Services, Inc.



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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NRC TO HOLD PUBLIC WORKSHOPS IN MARYLAND AND UTAH ON SAFE DISPOSAL OF DEPLETED URANIUM AND OTHER UNIQUE WASTE STREAMS

The Nuclear Regulatory Commission will conduct two public workshops in September to solicit public views on major issues for new regulations for land disposal of unique radioactive wastes, including but not limited to significant quantities of depleted uranium.

The workshops will be held Sept. 2-3 in Rockville, Md., and Sept. 23-24 in Salt Lake City, Utah. Exact locations and final agendas for the workshops will be announced closer to those dates.

The Commission directed the agency staff March 18 to initiate rulemaking to specify a requirement for a site-specific analysis for the disposal of large quantities of depleted uranium, and other unique waste streams, such as reprocessing wastes and the technical requirements for such an analysis. The Commission also directed the staff to develop a guidance document for public comment that outlines the parameters and assumptions to be used in the site-specific analyses. The Commission said the staff should "promptly" conduct a public workshop to discuss issues associated with disposal of depleted uranium and other unique waste streams, potential issues to be considered in rulemaking, and technical parameters of concern in the analysis so that informed decisions can be made in the interim before the rulemaking is final.

In a *Federal Register* notice published June 24, the agency staff discussed several questions relating to disposal of unique waste streams such as depleted uranium to be addressed at the public workshops. The agency also requested public comment on potential agenda items for the workshops as well as substantive issues for the rulemaking.

Public comments may be submitted to Chief, Rulemaking and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Mail Stop TWB 5B01M, Washington, D.C., 20555-0001, or by fax at (301) 492-3446. Comments may also be submitted electronically at <http://www.regulations.gov> using docket ID NRC-2009-0257.

Comments on agenda items for the public workshops should be postmarked no later than Aug. 1. Comments on the issues and questions presented in the *Federal Register* notice and discussed at the workshops should be postmarked by Oct. 30. Public comments made at both workshops will be transcribed and considered part of the record. The *Federal Register* notice also discusses how members of the public may inquire about direct participation in roundtable discussions at the workshops.

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NOTE: Anyone wishing to take photos or use a camera to record any portion of a NRC meeting should contact the Office of Public Affairs beforehand.

News releases are available through a free *listserv* subscription at the following Web address: <http://www.nrc.gov/public-involve/listserver.html>. The NRC homepage at www.nrc.gov also offers a SUBSCRIBE link. E-mail notifications are sent to subscribers when news releases are posted to NRC's Web site.

Dane Finerfrock - RE: Utah Radiation Control Board meeting

From: "Yadav, Priya" <Priya.Yadav@nrc.gov>
To: 'Dane Finerfrock' <dfinerfrock@utah.gov>
Date: 6/22/2009 9:40 AM
Subject: RE: Utah Radiation Control Board meeting
CC: "Bubar, Patrice" <Patrice.Bubar@nrc.gov>, "Suber, Gregory" <Gregory.Suber@nrc.gov>, "Grossman, Christopher" <Christopher.Grossman@nrc.gov>, "Esh, David" <David.Esh@nrc.gov>

Dane,

Thanks for the update. If the Board is interested in hearing more details about our staff's Technical Analysis of Depleted Uranium Disposal that we conducted during the development of SECY-08-0147, we could prepare a presentation for them. We plan to be in Salt Lake City for the DU workshop in September on September 23 and 24, so if the Board is interested in a presentation, we could attend a meeting on September 22 or 25. Please let me know if the Board is interested.

Priya Yadav, PE
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