Approved _____
Date

MINUTES OF THE Senate COMMITTEE ON Energy and Natural Resources.

The meeting was called to order by Senator Ross Doyen at
Chairperson

8:04 a.m./~~p.m.~~ on April 9, 1991 in room 423-S of the Capitol.

All members were present except: Quorum was present.

Committee staff present:
Pat Mah, Legislative Research Department
Raney Gilliland, Legislative Research Department
Don Hayward, Revisor of Statutes
Lila McClaflin, Committee secretary

Conferees appearing before the committee:

Stanley C. Grant, Acting Secretary, Department of Health and Environment
Shaun McGrath, Kansas Natural Resources Council
John Campbell, Deputy Attorney General, Litigation and Antitrust Division
Jim Powers, Department of Health and Environment
Scott Andrews, Sierra Club
Laura McClure, Concerned Citizen

The Chairman opened the hearing on SB 430 - amending the central interstate low-level radioactive waste compact.

Stanley Grant said the state of Nebraska has asked the other four states to amend the compact language to address four issues of concern in Nebraska (Attachment 1).

Stanley Grant, Jim Powers, and John Campbell stood for questions.

Shaun McGrath stated, he was also representing the members of the Kansas Wildlife Federation, the Kansas Rural Center, and the Kansas Audubon Council. They feel there are many unanswered questions resulting from SB 430, and they urged the bill be sent to an interim study (Attachment 2).

Scott Andrews spoke as an opponent and suggested SB 430 be sent to an interim study for an extensive look at the effects on Kansas and the environment (Attachment 3).

Laura McClure posed a lot of questions. She said it is still the belief of her groups that each state should take care of its own nuclear waste (Attachment 4). She provided information regarding the proposal and a copy of the amendments to Nebraska Law LB 827 was distributed and is on file in the office of Energy and Natural.

Responding to a question, Jim Powers said Nebraska had not been granted a license for the regional low-level radioactive waste facility yet.

John Campbell responded to questions regarding the compact contract and the possibility of litigation.

The Chairman requested Mr. Powers to analyze the questions and information presented at the meeting and report to him.

Senator Frahm moved to adopt the minutes of April 3, 1991 meeting. Senator Salle seconded the motion. Motion carried.

The Chairman adjourned the meeting at 9:00 a.m.

1991 SENATE ENERGY AND NATURAL RESOURCES COMMITTEE

Date April 9, 1991

PLEASE PRINT GUEST LIST

NAME	REPRESENTING
James Power	KDHE
Bruce Graham	KEPCo
[illegible]	KG&E
Ron Hammerschmidt	KDHE
Stan Grant	KDHE
[illegible]	AG
[illegible]	Gov
John D. McClure	Leg
[illegible]	self
Scott Andrews	Sierra Club
Joyce A. Wolf	Ks. Audubon Council
Shaun McGrath	KNRC
Ken Grotewiel	State Rep

STATE OF KANSAS

422 15

JOAN FINNEY, GOVERNOR

DIVISION OF THE BUDGET
Room 152-E
State Capitol Building
Topeka, Kansas 66612-1578

(913) 296-2436
FAX (913) 296-0231

April 16, 1991

The Honorable Ross Doyen, Chairperson
Committee on Energy and Natural Resources
Senate Chamber
Third Floor, Statehouse

Dear Senator Doyen:

SUBJECT: Fiscal Note for SB 430 by Committee on Ways and Means

In accordance with KSA 75-3715a, the following fiscal note concerning SB 430 is respectfully submitted to your committee.

SB 430 amends existing statutes regarding the Central States Low-Level Radioactive Waste Compact and its governing Commission. The bill amends the current policy and purpose statement to include a declaration that the activities of the Commission are the formation of public policy and are therefore public business.

The bill also provides that the Compact may establish fees to be assessed against waste generators. The bill would provide that industries that generate wastes would be responsible for payment of operating costs associated with the Compact. These costs would include the operation, monitoring, inspection, maintenance, decommissioning, closure, institutional control and extended care of the regional disposal facility. The bill would also provide that any liability, beyond that covered by insurance and other funds set aside for this purpose, which might arise from operation of the regional waste facility, would be shared among the member states of the Compact.

The bill provides that the host state (Nebraska, in the Central States Compact) would have two at-large members and one non-voting member on the Compact Commission. The non-voting member would be a resident of and would represent the county in which the disposal facility is located.

Under the bill, all meetings of the Commission would be subject to open meetings statutes and the Commission's records would be open to public review.

The Department of Health and Environment estimates that passage of the bill would have impacts on state expenditures, the amounts of which cannot be determined in the absence of actual experience.

Provisions of the bill requiring open meetings of the Commission could require some additional travel expenditures for Kansas' Commissioner (the Secretary of Health and Environment). The amount of this additional cost is estimated to be negligible and can be absorbed within amounts included in the *FY 1992 Governor's Budget Report*.

The agency estimates that shared liability for facility operations could have significant future fiscal impacts, depending on possible occurrences in connection with operation, monitoring and closure of the facility. The Department of Health and Environment estimates that the likelihood is slight that the state would be assessed liability for damages under this section of the bill. However, the amount of any potential impact cannot be determined but could range from no cost to multi-million dollar assessments against the state.

Sincerely,

Louis S. Chabira
Deputy Director

cc: Laura Epler, Health and Environment

4187

State of Kansas
Joan Finney, Governor

Department of Health and Environment
Office of the Secretary

Stanley C. Grant, Ph.D.,
Acting Secretary

Landon State Office Bldg., Topeka, KS 66612-1290

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Testimony presented to

Senate Energy and Natural Resources Committee

by

The Kansas Department of Health and Environment

Senate Bill 430

In response to the Low-Level Radioactive Waste Policy Act of 1980, the states of Arkansas, Kansas, Louisiana, Nebraska, and Oklahoma formed the Central Interstate Low-Level Radioactive Waste Compact Commission in 1983, and empowered it to carry out the party states' duties and responsibilities of low-level radioactive waste management. It is the Commission's responsibility to see that its party states preserve the health, safety, and welfare of their citizens and the environment, and provide for and encourage the economical management of low-level radioactive wastes.

The Commission sought to meet its responsibility of ensuring a developer be chosen and a facility built to handle the region's waste by a Request for Proposals (RFP) thereby giving any interested and qualified entity a chance to respond. Interested applicants were able to use the Request for Proposal as a guide for submitting a proposal to develop, construct, and operate a regional waste facility. The Commission met in Oklahoma City, Oklahoma, on June 29, 1987, and selected U.S. Ecology as the contractor to develop, construct, and operate the regional low-level radioactive waste facility.

At its meeting December 8, 1987, the Compact Commission selected the State of Nebraska as the initial host. The Commission also adopted the host state selection conditions proposed by Governor Orr of Nebraska. In June, 1990 the contractor, U.S. Ecology, submitted the license application to the State of Nebraska. Issuance of the license will allow the facility to become operational in 1993.

Management of low-level radioactive waste has been the subject of considerable controversy and emotion in recent years. The controversy has been heightened in Nebraska since the state was selected as the host state. Under former Governor Orr and present Governor Nelson, the

E&NR
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attachment 1
1&3

Charles Konigsberg, Jr., M.D., M.P.H.
Director of Health
(913) 296-1343

Ronald Hammerschmidt, Ph.D.,
Acting Director of Environment
(913) 296-1535

Lorne Phillips, Ph.D.,
Director of Information Systems
(913) 296-1415

Roger Carlson, Ph.D.,
Director of the Kansas Health and Environmental Laboratory
(913) 296-1619

State of Nebraska has asked the other four states to amended the compact language to address four issues of concern in Nebraska. These are as follows:

1. shared liability among party states,
2. open records,
3. open meetings, and
4. additional representation on the Commission by the host state.

The amendments which have been proposed by Governor Nelson address the following issues:

Shared Liability (Article III(d)

- Although the Compact currently addresses shared costs, Nebraska's Governor and its Legislature wish to clarify shared liability.

  (a) In Article III(d) of the Compact (K.S.A. 65-34a01), the language provides that all party states shall share in the cost in a manner to be determined by the Commission, if the Commission had reviewed and approved the host state fees. Material provided to the Kansas Legislature in 1982 noted the states would share in the costs associated with regulating, monitoring, and potential caring for a facility; but only in the event that the host state had sought Commission review and approval of the fee system. The concept was that the developer would have first responsibility, followed by the host state which had created a sinking fund; and if those funds were inadequate, the other party states would share responsibility.

- The new Nebraska amendments would remove Commission approval of the host state fee and provide notice to the Commission with opportunity to provide comments.

- The Nebraska amendments would expressly recognize seven purposes for which a host state may collect fees that are in addition to the rates charged by the regional facility operator. Nebraska has amended Article II, Definitions, by adding two new definitions -- decommissioning and institutional control; and amending the definition of extended care. This was done to clarify the terms used in Article III d (1) of the Compact.

- To the extent such fees collected by the host state are insufficient to pay for any costs or liabilities associated with the regional facility the states are liable only for costs which cannot be obtained from the regional facility operators, generators, funds established by the host state, and insurance or surety policies applicable to the regional facility.

Att 1
2-3

- The Nebraska amendment states that a reasonable collection effort, in case of bankruptcy by the regional facility operator, would be 60 days.

- The Nebraska amendment further requires that each state whose generators have used the regional facility shall have proportionate liability for any cost or liabilities when all other resources are exhausted, based on a volumetric basis.

Public Records (Article IV(h), also, Article I)

- The Commission will have to adopt an open records by-law consistent with the open records law of the host state. Any litigation must be filed in U.S. District Court of the host state.

Open Meetings (Article IV(d), also Article I

- The Commission will have to adopt an open meetings by-law consistent with the open meetings law of the host state. Any litigation must be filed in U.S. District Court of the host state.

Nonvoting Representative (Article IV(a)

- The Nebraska amendment also provides for two voting members from the host state on the Compact Commission and a nonvoting member from the county in which the regional facility is located.

Finally, the exact language must be passed by all states in the Compact and then approved by the Congress.

Testimony presented by:

Stanley C. Grant
Acting Secretary
Kansas Department of Health and Environment
April 9, 1991

Att. 1
3-3

Kansas Natural Resource Council

April 9, 1991

Testimony before the Senate Energy and Natural Resources Committee

Re: SB430 Concerning the Central Interstate LLRW Compact

From: Shaun McGrath, Program Director

My name is Shaun McGrath, and I represent the Kansas Natural Resource Council, a private, non-profit, organization which advocates sustainable resource policies for the state. Our membership is over 850 statewide. Today, I also represent the members of the Kansas Wildlife Federation, the Kansas Rural Center, and the Kansas Audubon Council.

The amendments proposed by Nebraska for the Central Interstate Low-Level Radioactive Waste Compact, as embodied in SB430, have extensive implications. We do not wish to appear as either proponents or opponents to the amendments, but rather to use this hearing as an opportunity to raise questions concerning the potential consequences of the proposed amendments. Due to the complexity of the LLRW disposal issue, and to the complexity of the proposed amendments, we advocate that the state take a very deliberate approach to the amendments, developing a strong degree of certainty as to the far-reaching effects of these amendments.

Questions

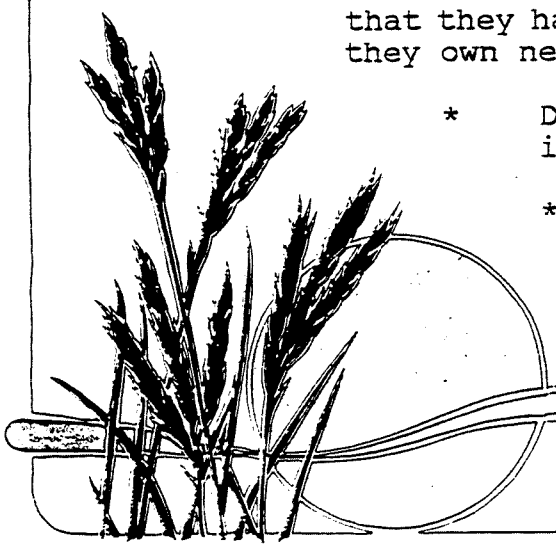
Article III. Section d. allows the host state to establish fees to be charged to the users of the disposal facility in order to "cover all anticipated present and future costs associated with" the facility.

* What is the expected cost for decommissioning, closure, institutional control, and extended care of the facility? Currently, the owners of Wolf Creek are not collecting money for these costs. Will there be sufficient money available from the generators to cover these costs?

* How can fees be assessed to generators for remediation of a site for which they have no authority? Generators can argue that they had nothing to do with site selection, and that they own neither the waste nor the site.

* Does liability insurance exist? If yes, what is the cost of the premiums?

* What is the expected cost of subsection 5: "compensation and incentives to the host community?" The residents of Boyd County are adamantly opposed to the site.



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Attachment 2

1516 Topeka Avenue • Topeka. Kansas 66612 • (913) 233-6707

* What is the implication of subsection 7: "cost of defending or pursuing liability claims against any party or state?" Could Kansas find itself in a situation where it has to pay for litigation against itself?

The new language on p. 4, lines 30-36 reads: "Notwithstanding anything to the contrary in this Compact, or in any state constitution, statute, or regulation to the extent that such fees are insufficient to pay for any costs associated with a regional facility, including all costs under section d. of this article, all **party states and any other state or states whose generators use the regional facility**, shall share liability for all such costs."

Clearly the intent of this language is to make party states liable for costs that can not be recovered from generators. Essentially, if Kansas agrees to this language Kansas will have agreed to unlimited liability for an unlimited time period.

* What is the fiscal impact of Article III. Section d. to the state of Kansas given unlimited liability?

* Does this language conflict with the language on p. 7, line 41? "The commission herein established is a legal entity separate and distinct from the party states and **shall be so liable for its actions.** Liabilities of the commission **shall not be deemed liabilities of the party states.** Members of the commission **shall not be personally liable** for actions taken by them in their official capacity."

* Will the other party states pass these proposed amendments? Does Kansas want to become the first state to pass the amendments, risking that the other states might not pass them? Should we make our signing onto these amendments contingent upon the other states?

On page 5, lines 16-19 reads: "All costs or liabilities shared by a state shall be shared proportionately by comparing the volume of the waste received at a regional facility from the generators of each state with the total volume of the waste received at a regional facility from all generators."

* Do operators of the facility have an economic incentive to declare bankruptcy (knowing the states will bail them out)?

* Is shared liability for everything? Would Kansas have to pay a share if Louisiana Power & Light declared bankruptcy?

* Liability is shared by volume, why not also by toxicity?

Existing language states that fees assessed by the host state shall "be based upon criteria established by the Commission." (P. 3, lines 34-37.) Yet the amendments proposed by Nebraska in Article III. Section d. clearly authorize Nebraska to develop the criteria.

* Is there conflicting language regarding the establishment of criteria for fees?

Nebraska's bill to amend the Compact begins with Section 1. which states: "Any party state which does not adopt the amendments made herein to the Central Interstate LLRW Compact may be denied access to a regional facility by the host state."

* What is the effect of this language? Will Kansas allow itself to be held captive?

Under the definition of institutional control, the host state will be responsible for the site for a period of 100 years after closure, yet some elements of the waste remain radioactive for 17 million years.

* Is the institutional control long enough, and what is the impact on Kansas (given unlimited liability for an unlimited period of time) of insufficient institutional control?

* Are the amendments proposed in SB430 compatible with the Atomic Energy Act of 1954?

The Proposed Boyd County Site

Before agreeing to the unlimited liability for an unlimited time period of the disposal facility, Kansas should undertake special study of the proposed site in Boyd County, Nebraska.

Of the Boyd County site, Dr. Marvin Resnikoff, Senior Associate at Radioactive Waste Management Associates of New York, writes: "The Boyd County site was poorly chosen and certain long-lived radionuclides will remain hazardous long after the institutional control period, when the site will not be regulated. As has been pointed out by several commenters, the site contains wetlands and is located in a 100 year floodplain. Over time, rainwater will infiltrate through the closure cap and disposal structure and into the waste which will then leach out into the shallow aquifer. There is some dispute when this will occur. The operator of the proposed Boyd County facility claims the structures will remain intact for 3,500 years. In any case, carbon-14, iodine-129, and niobium-94, with half-lives of 5,300, 17 million and 20,000 years respectively, will remain hazardous long after the proposed facility collapses."

Indeed, Nebraska is aware of the problems with the Boyd County site, and is already taking measures to deny a license to the site in LB827 before the Nebraska Unicameral this session.

KNRC, the Wildlife Federation, the Kansas Rural Center, and the Kansas Audubon Council feel that there are many more questions resulting from SB430 than there are answers. Due to the complexity of the issues, and because of the potentially extensive fiscal impact to the state created by the unlimited liability for an unlimited time period in the bill, we urge this committee to send SB430 to an Interim Study. The state can not afford to make decisions on this important issue based on insufficient information.

SIERRA CLUB

Kansas Chapter

Testimony to Senate Energy and Natural Resources

S.B. 430 - Amendments to Radioactive Waste Compact

I am Scott Andrews representing the Kansas Chapter of the Sierra Club. There are a number of concerns and unanswered question about the effects of these proposed amendments to the regional low-level radioactive waste compact. We believe this proposal should go to an interim study for a long hard look at the effects on Kansas and the environment.

I would like to outline some of the unanswered questions raised by this proposal:

- Liability - who is liable for the site and its impacts?
- Can Kansas be excluded from the compact by refusing to ratify the changes?
- Should Nebraska have cart blanche to raise fees that others must pay?
- Who is responsible if generators go bankrupt?
- Does the new language place more responsibility on the states and less on the generators?
- Who pays decommissioning costs?

It would seem prudent to take the time to study these amendments to ascertain the effect on Kansas and the environment rather than passing this bill quickly through at the end of the session. The Sierra Club urges you to refer S.B. 430 to interim study.

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attachment 3

April 9, 1991
Senate Energy and Natural Resourses Committee
Senator Doyen, Chairman
Concerning Senate Bill 430

Good morning, I'm Laura McClure past president of the North Central Kansas Citizens and the Kansas Coalition on Nuclear Waste. Our groups have worked on this issue for many years, it was and still is our belief that each state should take care of it's own Nuclear waste. But as a member of the Central Interstate Compact we need to be responsible and make it as safe as possible.

Most of my testimony will be questions.

On page 1 of the bill, line 41, the definition of decommissioning... this means decommissioning of the waste dump. Are the generators setting money aside now for that purpose? Does the developer (U.S.E.) have a fund set up for decommissioning of the waste site? Or will this be left up to the states?

On page 2, line 26, the definition of institutional control..."and other necessary activities at the site as determined by the host state and administration of funds to cover the costs for these activities." Is this giving Nebraska a blank check?

On page 4, line 3... this section gives Nebraska the ability to set the fees the states will pay for access to the waste facility. It takes it out of the hands of the Compact Commission (where we have a vote) and gives it solely to Nebraska. If we found the fees to be unreasonable we would have to take Nebraska to court. The fees are now $300.00 per cubic foot of waste, up from the original $120.00 figure given by U.S.E.

On page 5, line 3. Does this make it easier for U.S.E. or the generators to shift their liabilites to the states through Bankruptcy? Does this take away the incentives for the developer to build and operate the site properly?

(SEE ATTACHMENT 1) pages 8 and 9 According to Federal and State law "The disposal site shall be generally well drained and free of areas of flooding or frequent ponding. Waste disposal shall not take place in a 100 year floodplain or wetland."

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attachment 4
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Why did the developer choose 320 acres that contains 42.6 acres of wetlands and partially located in a 100 year floodplain of two streams?

(SEE ATTACHMENT 1) pages 10 and 11 Not only is the site in a 100 year floodplain, has 42.6 acres of wetlands,it also has an extremely shallow water table (5-15 feet). Do you think the developer can demonstrate that there is no alternative site that is obviously superior to the proposed site?

(SEE ATTACHMENT 1) page 4 Why weren't these documents available to South Dakota for their environmental impact review? Are they available to the Nebraska Department of Environmental Control for the licensing procedure?

The Kansas Geologic Survey has been asked to review the criteria submitted by the developer, will they have access to these documents?

What is the procedure if the site in Boyd County fails to meet the licensing criteria? Do we start all over with another developer? Do we go through the host state selection procedures again?

(SEE ATTACHMENT 1) pages 17 and 21 It appears that the developer is only planning the facility to handle 2.5 million cubic feet of waste. Three weeks ago a bill (Amendments to LB 827) passed out of the Nebraska Energy Committee attempting to change the amount of waste to be accepted by Nebraska from 5 million cubic feet to 2.6 million cubic feet, or 30 years, which ever comes first. What are the intentions of Nebraska and U.S.E.?

Changing the waste limit could have a major effect on Kansas... (SEE ATTACHMENT 2) Louisiana, on January 31, 1991 submitted an application to license a uranium enrichment plant, the tails (waste) will legally be considered source material and can be disposed of in the Nebraska site. This waste combined with the sludge from Kerr McGee in Oklhoma could quickly fill the Nebraska site opening up the host state selection again. We feel Kansas would be the next host state.

(SEE ATTACHMENT 3) This is a list of questions I feel need to be answered before we even consider looking at the language changes requested by Nebraska.

(SEE ATTACHMENT 4) In this monthly report it appears that USE/BNI didn't realize there were wetlands at the Boyd County site until after they had announced it's selection.

Should we agree to the major changes that Nebraska is proposing?

No. We are being asked to accept more of the liabilites for an unsound,politically selected site and give up our right to vote on fee increases for waste charges...I do not feel this is in the best interests of our State or our future generations.

Do we have an option? Yes. We do not have to pass this new language. According to our compact law 65.34a01 article VI section b "No party state shall pass or enforce any law or requlation which is inconsistent with this compact."

section c. "All laws and regulations or parts thereof of any party state which are inconsistent with this compact are hereby declared null and void for purposes of this compact. Any legal right, obligation, violation or penalty arising under such laws or regulations prior to enactment of this compact shall not be affected."

section d. "No law or regulation of a party state or of any subdivision or instrumentality thereof may be applied so as to testrict or make more costly or inconvenient access to any regional facility by the generators of another party state than for the generators of the state where the facility is situated."

infill Research 2

Zion Units 1 and 2

On January 31, 1991, the staff met with licensee near the Zion site to present the initial SALP 9 report for the Zion Station. The SALP report covered the period from October 1, 1989 through October 31, 1990. The Zion Station received a Category 3 rating in Plant Operation, Maintenance/Surveillance, and Engineering/Technical Support areas. The Plant Operation and Maintenance/Surveillance were rated Category 2 in the previous SALP. The remaining areas were rated Category 2, similar to previous SALP. However, declining trends were noted in Radiological Controls and Emergency Preparedness. Some improvements were noted in the Engineering/Technical Support area.

The Mayor of the City of Zion and other council members attended the SALP presentation. The mayor made a brief comment in the beginning, and at the end of the presentation. The mayor was supportive of NRC's actions for Zion Station, and expressed appreciation to the staff for keeping her informed in a timely manner.

Louisiana Energy Services

The application for a license for Louisiana Energy Services' gas centrifuge uranium enrichment plant was received on January 31, 1991. The plant, to be known as the Claiborne Enrichment Center, would be located in northern Louisiana. When fully completed, it would be capable of providing about 15 percent of United States power reactor utilities' requirements for uranium enrichment services.

Review of the application will begin immediately and is expected to take about two years to complete.

Meeting with Representative Boehlert and Others on Low-Level Waste (LLW) Storage

NRC staff members from OGC, GPA and NMSS met with Representative Sherwood Boehlert, members of his staff, Cindy Monaco, Cortland County Low-Level Radioactive Waste Coordinator and Patrick Synder, Attorney for Cortland County, to discuss and respond to a number of questions on LLW storage. The principal questions related to the Nuclear Regulatory Commission (NRC) position on storage of LLW, current NRC activities to address storage in connection with the title transfer and possession provisions of the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA), ability to store LLW beyond five years, relationship of LLW storage to high-level waste (HLW) storage and respective confidence in disposal capacity development and title transfer provisions of the LLRWPAA. In responding to the questions, staff reviewed the background and NRC position on storage as stated in previous correspondence. Ms. Monaco expressed interest in a 10 year storage period, and asked about NRC's reaction to that concept. Staff noted that NRC had been made aware of the concept through State correspondence. Staff noted that NRC's position that it will not look favorably upon long-term storage was based on a concern that storage would be used as a substitute for development of disposal capacity, which would be inconsistent with the LLRWPAA. NRC staff noted that the Commission had sought public comment on the issues associated with the title transfer and possession provisions of the LLRWPAA, including the issue of storage, and that the Commission would be addressing this area later in the year, after comments have been received and analyzed. Staff reviewed differences in LLW versus HLW storage and confidence in disposal, and explained the conclusions in the Commission paper regarding title transfer. Representative Boehlert and the others expressed their appreciation for the opportunity to meet and discuss these issues.

January 25, 1991

POLICY ISSUE

(Information)

SECY-91-019

For: The Commissioners

From: James M. Taylor
Executive Director
for Operations

Subject: DISPOSITION OF DEPLETED URANIUM TAILS FROM ENRICHMENT PLANTS

Purpose: To inform the Commission of the expected evolution of a unique licensing issue related to uranium enrichment plants.

Summary: This paper informs the Commission of a unique licensing issue related to disposition of depleted uranium tails from enrichment plants. In the past, depleted uranium tails have been considered a resource, not a waste. Presently, there is a surplus of these tails in the Western World. The U.S. Department of Energy (DOE) now has about one billion pounds of depleted uranium hexafluoride tails in storage. The U.S. Nuclear Regulatory Commission (NRC) soon expects to start a licensing review of an enrichment facility. In accordance with newly revised legislation, this will require NRC staff to prepare an environmental impact statement (EIS). The disposition of these tails will be considered in the EIS. The NRC staff does not know yet what DOE or the private sector will decide on the disposition of depleted uranium tails. This paper discusses plausible strategies to be considered. Since this paper is for information only, it does not contain recommendations. Because the expected evolution of the tails disposition issue is apparent, the staff hopes to obtain Commission comment if the Commission wishes to redirect that evolution, or to have now a more explicit Commission action on the issue.

Background: As part of the development of atomic weapons in the early 1940's, uranium enrichment received its primary impetus from the United States (U.S.) Manhattan Engineer District Project. For many years, until the early 1970's, the U.S. was almost the sole supplier of uranium enrichment services for industrial applications and to the commercial reactor industry in the Western world. The U.S. Atomic Energy Commission (AEC), later replaced by the U.S. Energy Research and Development Administration, initially provided these services. Presently, the U.S. Department of Energy (DOE) supplies such services.

Contact:
L. Roche, NMSS
X20695

NOTE: TO BE MADE PUBLICLY AVAILABLE IN 10 WORKING DAYS FROM THE DATE OF THIS PAPER

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Today, world production of enriched uranium is achieved primarily through gaseous diffusion and gas centrifuge processes. Laser techniques such as atomic vapor laser isotope separation (AVLIS) are still in the developmental stage. The readily volatile uranium hexafluoride (UF_6) is the chemical form enrichment plants use, in the present production methods, as feed material.

As a result of experiments conducted during the Manhattan Project, the centrifuge process was considered the most likely to succeed in separating uranium isotopes. However, gaseous diffusion prevailed over the centrifuge method because of the engineering problems the latter method presented at the time. Eventually, these engineering problems were resolved. Since the gas centrifuge technique is well suited for the separation of heavy isotopes, it is now one of the enrichment processes used in both Europe and the Far East (Japan). In the U.S., Louisiana Energy Services (LES) is proposing to construct a gas centrifuge facility.

After passing through an enrichment plant, natural uranium hexafluoride is separated into two fractions. The smaller of these fractions is the U-235 enriched product and the larger fraction is the U-235 depleted tails. If 3 percent U-235 enriched product with a tails assay of 0.2 percent U-235 is desired, 4.5 tonnes* of tails would be generated for every tonne of product. At a tails assay of 0.3 percent U-235, about 5.6 tonnes of tails would be generated for every tonne of product. In other terms, for these typical conditions, only 12 to 15 percent of the feed material ends up as product; the remainder becomes tails.

Discussion:

Since the early 1940's, the U.S. Government has been enriching uranium and saving virtually all the tails as depleted UF_6 (DUF_6). These tails have been considered a resource, not a waste, because of uses for depleted uranium metal and the potential use of depleted uranium oxide as breeder reactor blanket fuel. Laser isotope separation techniques such as AVLIS, if commercialized, could also be used to recover most of the U-235 in these tails. However, there would be a tradeoff on whether to feed AVLIS with DUF_6 tails or natural uranium at current low prices. The depleted uranium metal is used in munitions, tank armor, aircraft counter-weights, and radiation shielding in transport casks for radioactive material. However, because the U.S. does not have a breeder reactor program, the demand for DUF_6 is much less than the production rate, even with military uses.

* In the uranium enrichment industry, metric and English units are used interchangeably. The shipping cask's capacity is given in pounds, kilograms (kg) and short tons (2,000 pounds). Yet, the amount of enriched product and tails is given in kilograms and metric tons or tonnes (1,000 kg or about 2,200 pounds).

Usually, UF_6 is stored outdoors, at the gaseous diffusion plants, in Model 48G cylinders, with about 28,000 pounds (12,700 kg) maximum fill limit. (The 48G cylinder itself weighs about 2,600 pounds). DOE now has on the order of 500 x 10^6 kg of UF_6 (500,000 tonnes or about one billion pounds) in storage, mainly in 48G cylinders. Presently, there are various sizes of cylinders used for storage. For simplicity, if all cylinders are assumed to be the 48G type, and filled to the maximum limit, the DOE inventory of cylinders is approximately 40,000. In the past, the staff was not aware that DOE had any specific plans for disposition of UF_6. However, recent communications with DOE personnel seem to indicate that they are studying various options for disposition of this material. It should be stressed that DOE does not consider UF_6 as waste, but as a resource material.

In contrast, at the COGEMA center located in Pierrelatte, France, the UF_6 tails from the EURODIF enrichment plant have been partially recycled since 1984. The French Ministry of Industry limits the quantity of UF_6 tails that can be stored onsite at the enrichment plant. For this reason, COGEMA's W Plant was commissioned to convert UF_6 tails into U_3O_8 for safer storage and reuse in due time,* and into hydrofluoric acid (HF) aqueous solution for current commercial use. Based on information from COGEMA, and staff calculations, the cost of conversion would add to the price of product a percentage roughly equivalent to the percent of U-235 enrichment in the product, e.g., if the product were 3.7 percent enriched, the added price per kilogram of product would be about 3.7 percent.

It should be noted that HF is a very reactive and corrosive chemical that may cause unusually severe burns. Special precautions must be taken when handling it. These characteristics make manufacturing relatively expensive. Yet, it is marketable because of its wide commercial applications. HF, marketed in solution strengths of 30, 51, 60, and 80 percent, is used for etching glass and for cleaning metals, (i.e., as pickling acid in stainless-steel and non-ferrous metal manufacture).

There are large capital expenditures involved in setting up a defluorination plant similar to COGEMA's. But once this initial investment is made, this expenditure may be offset by having the uranium as U_3O_8, a more stable form than UF_6, and by potentially marketing the HF for other commercial uses. Presently, there are four major companies in the U.S.

---

* The U_3O_8 might be used in France's breeder reactor program or in its developing laser enrichment program.

with a total annual production capacity of about 218,000 tons (198 x 10^6 kg) of HF. Anhydrous HF sells for about $1,375/ton, and for $1,000/ton if it is 70 percent HF aqueous solution.

In addition, the U.S. supply monopoly of the uranium enrichment market has changed considerably since the late 1970's. Competition has created a DOE over-capacity estimated at around 6,000 tonnes of Separative Work (SW)* per year in 1990 with no significant change forecast for the next five years.

It is likely that DUF_6 will sooner or later be treated as a waste, since there is such a surplus of depleted uranium available. If so, it is a unique form of low-level waste that would require disposal.

The development of review procedures and licensing requirements for the disposal of UF_6 tails to be generated by an enrichment facility depends on the evaluation of several factors.

These factors are:

1. Determination of whether tails are a waste or resource
2. Assessment of the production rate and the chemical and radiological characteristics of the final form of the enrichment process tails.
3. Determination of the proper waste classification for tails
4. Analysis of disposal options

Each of these factors is discussed in the enclosure.

Notwithstanding these considerations, NRC soon expects to start a licensing review for an enrichment facility. In accord with newly revised legislation, this will require NRC staff to prepare an EIS. The disposition of tails will be considered in the EIS. The NRC staff does not know yet what DOE or the private sector will decide on the disposition of DUF_6.

Political and economic factors will undoubtedly have an impact on their course of action. Nevertheless, to give the Commission a general idea of plausible strategies, this paper discusses some, based on present state-of-the-art technology.

* A Separative Work Unit (SWU) or tonne of SW is a measure of the effort necessary to enrich uranium in the U-235 isotope, and is the basis for the sale of uranium enrichment services. A typical 1,200-megawatt nuclear power plant requires about 30 tonnes of enriched uranium per year, equivalent to about 130,000 SWUs.

The plausible strategies to be considered include:

1. Maintain the current practice in the U.S. and store DUF_6 at an enrichment plant site. If a licensee were to pursue this strategy, NRC would have to impose certain conditions such as inspection, surveillance, and maintenance programs. The staff does not expect these programs to have much impact on NRC resources. Storage appears to be relatively cheap and safe. DOE has found few incidents and safety problems in storing DUF_6 over long periods. As UF_6, the material is considered a resource, and it may offer flexibility to convert to a more desirable chemical form in the future. For example, it may be cheaper to convert DUF_6 to a more suitable chemical form for AVLIS feed.

   On the other hand, this approach leaves open the questions of final disposal if DUF_6 were ultimately considered to be a waste and not a resource. If released, it may pose potential hazards, [e.g., produces toxic compounds (HF and UO_2F_2) upon reacting with moisture in ambient air]. NRC could be open to criticism for not determining final disposition of this licensed material at an early stage.

2. Continuously convert DUF_6 during the enrichment production and dispose of converted product. As mentioned previously, France is converting some of the DUF_6 to U_3O_8, which is a more stable and environmentally safe form of uranium. Yet, it is still a resource. In addition, HF, which is a byproduct of this conversion, is sold in France for other commercial uses. As U_3O_8, the material may be stacked in storage containers, saving storage space. If considered a waste, it could be disposed of by placement in a mill tailings impoundment or in a LLW facility. (See enclosure.) There are also political and economic implications involved in these possible forms of disposal. This strategy requires less complex surveillance and maintenance programs at the enrichment plant site. But the conversion process is relatively expensive. It will also involve NRC resources to license and inspect the new conversion facility.

3. Conversion of DUF_6 at end of plant life and disposition of converted material. This is a combination of Strategies 1 and 2, with similar advantages and disadvantages. Ultimate disposition of U_3O_8, or any other form of converted product, must be made in due time. This material may be used as a resource for not yet defined uses, in the future. As mentioned in Strategy 2, if U_3O_8 is considered a waste, it will require final disposal (See enclosure).

Conclusions:

The need to address the final disposition of DUF_6 tails from the enrichment plant has been discussed with the prospective applicant, LES. However, LES has not indicated its choice of options. Under 10 CFR 70.25, the applicant must provide financial assurances for decommissioning. Since NRC does not regulate DOE, this will have an economic effect on LES but not on DOE. As discussed previously, defluorination of DUF_6 is currently being done in France. Annually, the major products at the COGEMA defluorination plant are 7,000 tonnes of U_3O_8, which are stored as a future fuel resource, and 4,300 tonnes of 70 percent aqueous solution of HF, which are sold for current industrial applications.

There are several factors that will influence LES' (or any other U.S. enrichment plant's) final disposition of DUF_6. There are large capital expenditures involved in setting up a defluorination plant similar to COGEMA's. But once this initial investment is made, this expenditure may be offset by having the uranium as U_3O_8, a more stable form than UF_6, and by potentially marketing the HF for other commercial uses. In the future, there may be reasons to restrict or limit the amount of DUF_6 stored on site. In conclusion, disposition of tails from an enrichment plant presents a unique licensing issue. The staff anticipates that these issues will be further evaluated in the EIS for the LES plant and in the licensing process.

Coordination:

The Office of the General Counsel has reviewed this paper and has no legal objection.

James M. Taylor
Executive Director
for Operations

Enclosure:
Factors Involved in the Disposition
of Depleted Uranium Hexafluoride
(DUF_6) Tails

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ENCLOSURE

FACTORS INVOLVED IN THE DISPOSITION OF DEPLETED URANIUM HEXAFLUORIDE DUF_6 TAILS

Developing review procedures and licensing requirements for disposing of DUF_6 tails generated by an enrichment facility depends on evaluating the following factors:

1. Determination of whether tails are a waste or resource
2. Assessment of the production rate and the chemical and radiological characteristics of the final form of the enrichment process tails
3. Determination of the proper waste classification for uranium hexafluoride (UF_6) tails
4. Analysis of disposal options

Each of these factors is discussed in the following paragraphs. However, it should be noted that without knowing the specifics of the enrichment process, the following discussion must be generic. The amount of UF_6 tails and their activity depend on specifics such as the uranium-235 content of the feed and the efficiency of the process used for enrichment.

DETERMINATION OF WHETHER THE TAILS ARE A WASTE OR RESOURCE

The U.S. Department of Energy (DOE) has considered, in the past, that UF_6 tails were a resource for future use as blanket material for breeder reactors, for munitions, and for other purposes where the high density of uranium metal is desirable, (e.g., aircraft counterweights). DOE stores the DUF_6 in 10- to 14- ton steel cylinders at its three gaseous diffusion plant sites. About 40,000 cylinders have been used to store approximately one billion pounds of DUF_6, increasing at the rate of about 40,000,000 pounds per year.

The recently passed Defense Appropriations Bill for 1991 includes a provision for the Government to acquire, from domestic sources, for the National Defense stockpile, 36 million pounds of depleted uranium metal, over a period of 10 years. This amounts to about 5.3 million pounds of DUF_6 per year, which is only 0.5 percent of the stored DUF_6, or about 7.5 percent of the DUF_6 created per year in the United States. In other words, acquisition of depleted uranium metal for the National Defense stockpile will have little effect on the tails disposition situation and a determination of whether the tails are waste or a resource. Inasmuch as the United States has no current plans for breeder reactors, and the uses for depleted uranium metal are limited, any determination

that DUF_6 tails are a resource will likely have to be made on a policy or political basis. For the purposes of this paper, the rest of the discussion assumes that DUF_6 tails are waste, requiring conversion to a chemically stable form and appropriate disposal.

ASSESSMENT OF THE PRODUCTION RATE AND THE CHEMICAL AND RADIOLOGICAL CHARACTERISTICS OF THE FINAL FORM OF ENRICHMENT PROCESS TAILS

As stated previously, a thorough analysis of the UF_6 product to tails ratio is not possible without a detailed description of the planned enrichment process. However, the following generic facts are known. Approximately 85 to 90 percent of the UF_6 processed through an enrichment facility are returned as tails. For example, to produce 1,000 kg of 3 percent U-235 enriched uranium, approximately 6 tonnes of uranium feed would be put through the enrichment process, and approximately 5,000 kg of 0.25 percent U-235 DUF_6 tails would be generated.* The yearly tails output from the U.S. reactor enrichment services is 20,000 tons.

UF_6 is a solid at room temperature and pressure, but it is volatile and sublimes at 56 degrees centigrade. When exposed to moisture, UF_6 will hydrolyze and produce uranyl fluoride and hydrofluoric acid. Both products are soluble in water and pose potential health hazards. Although UF_6 is not listed as a hazardous waste, both uranyl fluoride and hydrofluoric acid are Environmental Protection Agency (EPA) hazardous wastes. The chemical hazard posed by disposal of UF_6 will most certainly necessitate conversion to a more stable form before disposal. The most stable of the uranium fluorides is UF_4, to which the hexafluoride is easily reduced. However, conversion to one of the higher oxides offers even greater stability. Regardless of the conversion process, hydrogen fluoride recovery could possibly be an economic incentive for conversion. For purposes of this paper, it will be assumed that the DUF_6 will be converted to uranium oxide.

DETERMINATION OF THE PROPER WASTE CLASSIFICATION FOR UF_6 TAILS

Under 10 CFR 61.58, the Commission may authorize other provisions for the classification and characteristics of waste, on a specific basis. This will be the case if, after evaluation of the specific characteristics of the waste, disposal site, and method of disposal, the Commission finds reasonable assurance of compliance with the performance objectives of Subpart C of Part 61. Comparison of depleted uranium tails to uranium mill tailings, LLW and high-level waste (HLW) can provide insight into alternate disposal options.

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* Tails from a laser enrichment process might have a very different composition and characteristics than tails from the gaseous diffusion or gas centrifuge processes.

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depleted uranium tails from the enrichment process are source material and, if waste, are included within the definition of LLW, and could be disposed of in a LLW disposal facility licensed under 10 CFR Part 61, if in proper waste form. Review of the Environmental Impact Statement supporting 10 CFR Part 61 shows that although NRC considered the disposal of uranium and UF_6 conversion facility source terms in the analysis supporting Part 61, NRC did not consider disposal of large quantities of depleted uranium from an enrichment facility in the waste streams analyzed because there was no commercial source at that time. Therefore, analysis of the disposal of depleted uranium tails from an enrichment facility at a Part 61 LLW disposal facility should be conducted similar to the pathway analyses conducted in support of Part 61. Under 10 CFR 61.55(a), DUF_6 tails are Class A wastes. However, if stored or disposed of in 48G casks, they would not meet the minimum waste form requirements in 10 CFR 61.56(a).

It is customary for the provider of the enrichment service to offer the depleted uranium tails, together with the enriched product, to its customer. The general expectation is that the customer will decline to accept the depleted uranium tails. In the present competitive market, it is also likely that the enrichment plant would agree to keep these tails. Then, there are several possible scenarios concerning the responsible entity that would regulate the offsite disposal of the depleted uranium tails.

One scenario is to assume LES to be the enrichment plant accepting the depleted uranium tails and converting them to a proper waste form for final disposal. Classification of these converted tails as LLW, under the current provisions of the Low Level Radioactive Waste Policy Amendments Act of 1985, therefore, makes the State of Louisiana, an Agreement State, the entity that would regulate the offsite disposal of depleted uranium tails. Depending on the details of the central compact of which Louisiana is a member, classification of these tails as LLW could automatically require the compact facility to accept the tails for disposal. But conversion of these tails on the LES site would change the nature of the enrichment plant license, and the NRC would have to address the issue.

Another scenario could be for the enrichment plant to send the depleted tails to be converted to a proper waste form to a processing plant in another State, with access to a LLW disposal facility, therefore, likely providing a route for final disposal. If the processing plant is, however, in a State that does not have access to a LLW disposal facility, final disposition of the tails may be cumbersome.

If we compare the radiological characteristics of depleted uranium tails with the radiological characteristics of uranium mill tailings, and with LLW and HLW, the depleted uranium tails from the enrichment process appear to more closely resemble uranium mill tailings. However, the differences are sufficient to consider them a unique waste form.

HLW, by definition, is irradiated reactor fuel; liquid waste resulting from the operation of the first cycle solvent extraction system or equivalent; the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel; and the solids into which these liquids have been converted. These wastes contain large quantities of long and short-lived radionuclides and transuranics with very high levels of activity. For example, 10-year-old spent fuel per reactor-year of operation constitutues 35 cubic meters (m^3) of waste, with activity levels of 11,000,000 curies. In comparison, tails from the enrichment process do not reach the activity levels of HLW. For example, depleted uranium tails as U_3O_8 (if converted) have an activity level of about 0.31 μCi/g, which equates to approximately 62 curies of activity for the 200 metric tons of tails per reactor-year. This is about 2 Ci/m^3 for the uranium isotopes, or about 5 $Ci/m,^3$ including the Th-234 and Pa-234 decay daughters. Ingrowth of other decay products is extremely slow, requiring tens of thousands of years. This discussion assumes that no recycled uranium is involved.

Uranium mill tailings result from the chemical processing of uranium ore to produce a uranium-rich U_3O_8 compound called "yellow cake." The principal radionuclides in these tailings are uranium, radium-226 and its decay products, and thorium-230. However, radium and its decay products constitute the activity of concern, since essentially all the uranium is removed in the milling process. Thus, uranium radioactivity levels in the tailings are substantially less than the radium radioactivity levels. For example, long-lived uranium activity level in mill tailings is approximately 25 pCi/g, whereas the radium-226 level averages 450 pCi/g, with a half-life of 1,600 years. However, the low uranium content of the ore processed in the mill, the extraction of the uranium, and, finally, clean-up of the mill sites, produces large quantities of waste that are comprised mainly of soil and crushed rock, plus process chemicals. The depleted uranium tails are similar to mill tailings in that they contain uranium. But they are dissimilar in that depleted uranium tails are essentially free of thorium-230 or radium-226 and its decay products, and the uranium activity level is higher (0.31 μCi/g, if converted to oxide form). Depleted uranium tails also differ from mill site wastes in that they are concentrated U_3O_8 (if converted), rather than large quantities of soil mixed with small amounts of radioactive material.

LLW, which refers to all radioactive waste other than HLW, uranium mill tailings, and TRU waste, constitutes the majority of waste generated by the fuel cycle. However, LLW contains a relatively small portion of radioactivity. Although the long-lived isotopes of uranium, thorium, and low concentrations of TRU and other long-lived radionuclides can be present in LLW, the bulk of the radioactivity results from cobalt-60, cesium-134, cesium-137, and other lower-yield fission and activation products with maximum half-lives of approximately 30 years. LLW decays to low radioactivity levels in tens to hundreds of years, but it requires isolation during that time. The depleted uranium tails from the enrichment process are different from most LLW, in that they contain solely the long-lived isotopes of uranium in concentrated form, plus Th-234 and Pa-234. However, in accordance with 10 CFR Parts 40 and 61,

ANALYSIS OF DISPOSAL OPTIONS

If DUF_6 tails are determined to be waste, there appear to be three options that might be considered for disposal of the tails after conversion to a more chemically stable form of uranium. The options would need additional investigation by an applicant and the staff to determine their acceptability.

1. Legally, the tails are considered source material and can be disposed of as LLW waste under the requirements of 10 CFR Part 61. As stated previously, detailed pathway analysis of depleted uranium, as conducted in the development of 10 CFR Part 61, should be conducted following the provisions of 10 CFR 61.58. Section 61.58 states: "The Commission may, upon request or on its own initiative, authorize other provisions for the classification and characteristics of waste, on a specific basis, if, after evaluation, of the specific characteristics of the waste, disposal site, and method of disposal, it finds reasonable assurance of compliance with the performance objectives in Subpart C of this part."

2. The second option is to dispose of the depleted uranium in an existing uranium mill tailings impoundment and apply the regulatory provisions of Appendix A to 10 CFR Part 40. Once again, pathway analysis should be conducted to ensure protection of the public health and safety from the addition of concentrated U_3O_8 to the impoundments. In addition, the disposal of the tails in this manner ultimately will involve land transfer of tailings disposal areas to the Federal Government.

3. The third option is to dispose of the depleted uranium in a separate facility licensed under Part 61, also applying the provisions of 10 CFR 61.58.

Research in full

COMMENTS ON THE REVIEW OF THE U.S. ECOLOGY ENVIRONMENTAL REPORT

by

State of South Dakota

prepared for

Nebraska Department of Environmental Control

September 12, 1990

1.0 REVIEW BASIS

The basis for this review of the environmental report (ER) submitted by the U.S. Ecology to the Nebraska Department of Environmental Control includes the following documents:

Title 194 – *Rules and Regulations for the Disposal of Low-Level Waste* developed by the Nebraska Department of Environmental Control (NDEC), July 1989.

Regulatory Guide 4.18 – *Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste*, developed by the U.S. Nuclear Regulatory Commission (NRC) – Office of Nuclear Regulatory Research, June 1983.

Regulatory Guide 4.19 – *Guidance for Selecting Sites for Near-Surface Disposal of Low-Level Radioactive Waste*, developed by the U.S. Nuclear Regulatory Commission (NRC) – Office of Nuclear Regulatory Research, August 1988.

Title 194 was developed by NDEC with the intent of complying with NRC's *Licensing Requirements for Land Disposal of Radioactive Wastes* (10 CFR 61). Title 194 represents the regulatory basis for NDEC to license a low-level waste (LLW) disposal facility in Nebraska. The ER submitted by U.S. Ecology is required by Title 194 as part of the license application. Regulatory Guides 4.18 and 4.19 (subsequently referred to as NRC 4.18 and 4.19, respectively) provide excellent resources for conducting this review because they were developed by NRC to provide guidance for preparing an environmental report and selecting sites for disposal of low-level waste. In fact, the structure and forms of the ER submitted by U.S. Ecology closely follow the recommendations in NRC 4.18. Although most of the comments are based on the three documents referenced above, some comments are based on other regulations or involve clarification questions stemming from lack of specificity, detail, and substantiation.

The review comments presented in subsequent sections represent only a portion of the anticipated comments for the following reasons:

- Insufficient time was allowed for review.
- Much of the information in the ER was incomplete which prevented an adequate assessment of numerous issues.
- Inconsistencies with federal and state regulations and guidelines require an explanation prior to completion of the review.
- The Safety Analysis Report and approximately 11 other supporting documents cited in the ER were not available to the reviewers. These documents need to be released and the review deadline extended to ensure a proper assessment of the ER.

Consequently, additional comments will be submitted following the resolutions of these problems.

Comments stemming from this review of the ER have been categorized into four sections:

1. General
2. Site Selection
3. Facility Design
4. Data Sufficiency and Quality

Each category begins with a citation of acts, regulations, and/or guidelines that form a basis for subsequent comments that include questions and requests. This approach demonstrates that the review of the ER was conducted in a credible and defendable manner.

2.0 GENERAL

2.1A BASIS

"The environmental analysis information specified in [Title 194] Chapter 10, 002.03 shall be included in the [license] application."

Title 194, Ch. 3, 007

"The [environmental] analysis shall address each subject listed in Public Law 91-190, Title I, section 102(2)(c), 83 Stat. 853, and supporting regulations, ..."

Title 194, Ch. 10, 002.03

"Each subject [in the environmental report] should be treated in sufficient depth and with sufficient documentation to permit the [Nuclear Regulatory] Commission to independently evaluate the extent of the environmental impact."

NRC 4.18, Sec. 3c of Introduction

"Some of the information to be included in the environmental report may already have been prepared by the applicant during preparation of the license application for the proposed project. In such cases, this information ... may be incorporated in the environmental report by reference."

NRC 4.18, Sec. 3c of Introduction

"Any reports of work (e.g., ecological surveys) supported by the applicant that are of significant value in assessing the environmental impact of the facility should be included as appendices or supplements to the environmental report unless these reports are otherwise generally available."

NRC 4.18, Sec. 8.1

2.1B COMMENT

In attempting to address each subject listed Title I, Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 83 Stat. 853), the applicant clearly structured the *Environmental Report* (ER) following the guidance provided by the Nuclear Regulatory Commission (NRC) in *Regulatory Guide 4.18* (NRC 4.18). As provided by NRC 4.18, the ER references other reports prepared by the applicant or by the contractors to the applicant. Specifically, the following documents are needed to permit an independent evaluation of the extent of the environmental impact:

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- U.S. Ecology, Inc., 1989. *Site Identification Process for the Central Interstate Compact Low-Level Radioactive Waste Disposal Facility, Final Report.*
- U.S. Ecology, Inc., 1990a. *Plan for Field Measurement, Sampling, and Analysis to Support Site Characterization for the Central Interstate Compact Low-Level Radioactive Waste Disposal Facility.*
- U.S. Ecology, Inc., 1990b. *General Site Characterization Plan*, 19185-1420-CPP-01.
- U.S. Ecology, Inc., 1990c. *Central Interstate Compact Safety Analysis Report.*
- Woodward-Clyde Consultants, Inc., 1989a. *Biological Resources Work Plan*, prepared by Woodward-Clyde Consultants, Contract No. 19185-1420-TSC-008.
- Woodward-Clyde Consultants, Inc., 1989b. *Cultural Resources Investigation Work Plan*, prepared by Wichita State University, Wichita, KS.
- Woodward-Clyde Consultants, Inc., 1990a. *Ambient Noise Report for the Central Interstate Compact Low-Level Radioactive Waste Facility Project*, Environmental Characterization Technical Services, Denver, CO.
- Woodward-Clyde Consultants, Inc., 1990b. *Biological Resources Technical Report*, Environmental Characterization Technical Services, Denver, CO.
- Woodward-Clyde Consultants, Inc., 1990c. *Cultural Resources Report*, prepared by Wichita State University, Wichita, KS, Contract No. 19185-1420-TSC-008.
- Woodward-Clyde Consultants, Inc., 1990d. *Socioeconomic Work Plan*, prepared by Planning Information Corporation, Denver, CO.
- Woodward-Clyde Consultants, Inc., 1990e. *Socioeconomic Report*, prepared by Planning Information Corporation, Denver, CO.
- Woodward-Clyde Consultants, Inc., 1990f. *Geography, Demography, and Future Developments Technical Report*, prepared by Planning Information Corporation, Denver, CO.

Without the foregoing references accompanying the ER, it is impossible to independently evaluate the environmental impact of the proposed project, much less to assess the sufficiency and accuracy of the analyses in the ER. When will these supporting documents be made generally available so that an independent review of the ER can be completed?

2.2A BASIS

"The specific technical information [in the license application] shall include the following information needed for demonstration that the performance objectives and technical requirements of this Title will be met: ... A description of the kind, amount, classification, activity and specifications of the waste proposed to be received, possessed, and disposed of at the facility."

Title 194, Ch. 3, 003.09

"Only low-level radioactive waste shall be disposed of at the disposal site except mixed waste which is solidified, neutralized, and stabilized to the maximum degree practicable prior to shipment to the facility. See Title 128 for any hazardous waste permit which may be required for the facility to accept mixed waste."

Title 194, Ch. 5, 003.01K

2.2B COMMENT

It is stated in the ER (page 1-5) that "the mixed waste permit application will be submitted at a later date and will provide a more detailed description of the mixed waste disposal unit, its operation, and the waste streams for disposal." With that and similar statements in the ER, the detailed discussion of mixed-waste disposal is deferred to a future permit application.

Although Title 194 makes it clear that any hazardous waste permits are regulated by Title 128 and cannot be granted as part of the licensing process under Title 194, it is equally clear that any waste that could affect whether or not the performance objectives will be met must be described in the license application. Without a complete description of the mixed-waste composition and the procedures for disposing of mixed waste, it cannot be determined whether or not mixed-waste disposal will affect performance.

Although mixed waste contains a hazardous-waste component, it is nonetheless radioactive. Consequently, its contribution to expected radioactive exposures should be included in the safety analyses. Further, many of the procedures for assuring/confirming acceptable mixed-waste composition, for disposing of mixed waste, and for addressing spill control and accidental releases of mixed waste may have an adverse impact on or may be incompatible with otherwise safe practices for dealing with low-level waste (LLW). Finally, disposal of organic wastes in proximity to LLW raises the issue of chemical complexing and colloidal transport of radionuclides. Complexing and colloid formation could enhance LLW mobility and make predictions of groundwater transport overly optimistic.

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As at the Waste Isolation Pilot Plant (WIPP) in New Mexico, the license for LLW disposal should not be acted on until mixed-waste issues are also addressed. Otherwise, how can the overall radiological safety of the facility be adequately judged with only a partial description of the waste stream?

2.3A BASIS

> *"The specific technical information [in the license application] shall include the following information needed for demonstration that the performance objectives and technical requirements of this Title will be met: ... A description of the quality control program for the determination of natural disposal site characteristics ..."*
>
> Title 194, Ch. 3, 003.10

> *"Sampling design, frequency, methodology (including calibration and checks with standards), and instrumentation for both collection and analysis should be discussed as applicable. In all cases, the applicant should estimate the statistical validity of any proposed sampling program. Information should be provided on instrument accuracy, sensitivity, and (especially for highly automated systems) reliability."*
>
> NRC 4.18, Sec. 8

> *"The program to collect the initial or baseline environmental data ... should be described in sufficient detail to make it clear that the applicant has established a thorough and comprehensive approach to environmental assessment."*
>
> NRC 4.18, Sec. 8.1

2.3B COMMENT

The only mention of quality control in the ER is in the description of the pre-operational monitoring program that was used to establish the meteorological baselines. The ER simply asserts that "a comprehensive quality assurance/quality control (QA/QC) program was enforced" throughout that particular program. Although detailed descriptions of the QA/QC programs enforced during all of the site characterization activities are beyond the scope of the ER, the absence of references to documentation for the QA/QC programs and their implementing procedures makes the quality of the data and analyses presented in the ER suspect. Where are the QA/QC programs and procedures described? Please provide documentation of sampling and testing procedures, evidence that the data that were obtained meet the applicable QA/QC standards, evidence that the personnel who collected the data had the necessary academic background and training prior to data acquisition, and evidence that the QA/QC programs and procedures were audited periodically.

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2.4A BASIS

"NEPA requires that all reasonable alternatives (i.e., those that are practical or feasible) to the proposed action be considered in detail to evaluate their comparative merits"

Regulatory Guide 4.18/Sec. 2

"Consideration of alternatives to the activities to be conducted..."

Title 194, Ch. 10, 002.03C

2.4B COMMENT

The alternatives to the proposed action consisted of no-action, extended storage of LLW at point of origin, storage facility in Nebraska, disposal at the facility in another compact, and stopping the generation of waste. The discussion of these alternatives lacks the detail to evaluate their comparative merits because only the negative attributes are presented. For instance, positive attributes of extended storage of LLW such as reducing the impact of short-lived radionuclides and providing a mechanism to consolidate waste were not mentioned. Some alternatives were neither practical or feasible such as no-action and stopping the generation of waste. Finally, alternatives presented do not represent a comprehensive assessment of all reasonable alternatives. For example, amendments to the LLRWPA could be proposed that could reclassify wastes or reduce the number of LLW facilities in the country. The development of this section provides another example that the environmental report is deficient. Given the cited weaknesses in the development of alternative actions, will remedies be imposed on the applicant?

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3.0 SITE SELECTION

3.1A BASIS

"The disposal site shall be generally well drained and free of areas of flooding or frequent ponding. Waste disposal shall not take place in a 100-year flood plain or wetland as defined in Executive Order 11988, 'Floodplain Management Guidelines.' "

Title 194, Ch. 5, 001.01E

" 'Disposal site' means that portion of a facility used for disposal of waste. It consists of disposal units and a buffer zone."

Title 194, Ch. 1, 015

" 'Buffer zone' means a portion of the disposal site that is controlled by the licensee and that lies under the disposal units and between disposal units and the boundary of the site."

Title 194, Ch. 1, 003

"In evaluating sites for LLW disposal, it is important that a reasonable effort be made to select candidate sites with natural conditions that will maintain radionuclide releases to the general environment as low as is reasonably achievable. The NRC staff considers the long-term contribution of the natural conditions of the site essential in protecting the general population against releases of radioactive material."

NRC 4.19, Sec. B

"The disposal site shall be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives of [Title 194] Chapter 4 will be met."

Title 194, Ch. 5, 002.02C

"In general, sites should not be located in areas where extensive hydraulic design features will be needed to provide flood protection or erosion protection for the site ... because (1) they may lose their effectiveness over time without maintenance ..."

NRC 4.19, Sec. 1.4

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3.1B COMMENT

The ER (page 6-39) states that "The site boundary is defined by security fencing that surrounds the 320 acres of the site. This boundary provides a buffer zone that separates the public from the waste disposal units." Hence, the applicant acknowledges that the entire 320 acres constitutes the *disposal site* as defined in Title 194. Further, the applicant acknowledges that the 320-acre site contains 42.6 acres of U.S. Army Corps of Engineers jurisdictional wetlands (Table 4-47 of the ER) and that part of the site is in the existing 100-year floodplain of two ephemeral streams (page 5-84 of the ER). Although the facility layout is designed so that the disposal units are not located in the wetlands and although the site will be graded with drainage structures so that the disposal units will not be affected by flooding, these characteristics of the proposed disposal site are clearly contrary to the intent of site suitability requirements in Chapter 5 of Title 194.

The primary intent of these requirements is not protection of wetlands (pursuant to Section 404 of the Clean Water Act) or protection of occupants of floodplains (pursuant to Executive Order 11988). The primary concern is selecting sites with natural conditions that contribute substantially to the long-term isolation of waste. Periodic ponding of surface water because of poor drainage may reduce the stability of the disposal units and waste forms and could transport any releases rapidly to the general population. **Considering the indications (presence of wetlands and 100-year floodplain) that the proposed disposal site is not generally well drained, why is the Boyd County site even considered a suitable site, much less the preferred site?**

Poor natural conditions, such as poor drainage, place an unacceptably great reliance on the long-term performance of the engineered facility (including drainage structures). Note that in reference to high-level waste, Congress and the NRC have held that an unacceptable site cannot be rehabilitated by an engineered system. **Why is this not the case for the Boyd County site, especially since Title 194 appears to put the burden for acceptable performance on the natural site conditions with complementary support from the facility design?**

3.2A BASIS

> *"Facilities shall be sited ... with an objective of zero-release and with reasonable assurance that exposures to individuals are within the limits established in the performance objectives in 002 through 005 of this Chapter."*
>
> Title 194, Ch. 4, 001

> *"Reasonable effort should be made to limit releases of radioactivity in effluents to the general environment as low as is reasonably achievable."*

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"In evaluating sites for LLW disposal ... a reasonable effort [should] be made to select candidate sites with natural conditions that will maintain radionuclide releases ... as low as reasonable achievable."

NRC 4.19, Sec. B

"The NRC staff suggests that the applicant consider each category in Chapter 3 of Regulatory Guide 4.18 during the site screening process."

NRC 4.19, Sec. 2.3

"Meterological data are needed primarily for three analyses: determining a water budget for the disposal site; analyzing the airborne pathway; and determining the frequency, probability, and potential consequences of severe meteorological phenomena."

NRC 4.18, Sec. 3.3.1

3.2B COMMENT

The ER (page 7-31) acknowledges that atmospheric release of radioactive materials is a potential source for human exposure from normal facility operation and contends that groundwater and surface water are not considered potential pathways of normal operation. Despite the applicant's assessment of the importance of airborne transport to safety, meteorological characteristics such as prevailing wind direction and velocity and proximity to downwind resources (e.g., wetlands, rivers) and population were not considered in the site selection process. **Why shouldn't the site selection process be repeated to include this acknowledged important characteristic?**

3.3A BASIS

"Whatever site selection process is used by the applicant, ... it should be logically sound, defensible, and useful for decision making."

NRC 4.18, Sec. 2.1

"It should be demonstrated that the candidate sites are among the best that could reasonably be found."

NRC 4.18, Sec. 2.1.2.3

"It should be possible to demonstrate that there is no alternative site that is obviously superior to the proposed site."

NRC 4.18, Sec. 2.1.2.4

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3.3B COMMENT

At the outset of the siting process (statewide to 111 PSA's), emphasis was placed on a quantitative ranking based on objective criteria. Subsequently, during the Delphi process in which 27 representative PSA's were ranked by the Citizens Advisory Committee, some shifting of preferences was noted when the locations of the PSA's were provided (page 4-10 of the ER). The basis for this shifting of preferences with respect to location is not described. Nonetheless, it is noted that all three of the candidate sites selected from among the 111 PSA's are located within 30 miles of the state border. **Explain this coincidence and elaborate on the technical basis for the shifting of preferences with respect to location.**

Moreover, when selecting the preferred site from among the three candidates, comparisons were qualitative and subjective instead of being quantitative and objective as they appear to have been in the preceding statewide-to-PSA and PSA-to-candidate screenings. As characterized in the ER, the Boyd County site has an extremely shallow water table (5–15 feet), has wetlands within the disposal site, and is partially within a 100-year floodplain. **Given that groundwater and surface water were consistently ranked the first and third most important considerations in the site selection process (Table 4-1 of the ER), how is it shown that there is no alternative site that is obviously superior to the Boyd County site?**

3.4A BASIS

> *"In presenting the analysis [of the proposed site selection], a tabular format showing side-by-side comparison of alternatives with respect to the selection factors should be used insofar as possible."*
>
> NRC 4.18, Sec. 2.1.2.4

3.4B COMMENT

The applicant followed the NRC guidance for presenting the selection of the preferred site in the form of a tabular comparison between the candidate sites (Table 4-47 of the ER). However, the ER appears to be a flawed document that is promoting the Boyd County (Butte) site at the expense of an impartial evaluation based on fact. For example, in the side-by-side comparison in Table 4-47, it is stated that "Waste disposal will not take place within the 100-year floodplain of the ephemeral streams" on the Nuckolls and Nemaha sites. Later in the ER (Page 5-84), it is acknowledged that part of the Boyd County site will lie in such a floodplain. Please comment on the observation that this omission in Table 4-47 is intentionally misleading and avoids juxtaposing a potentially disqualifying characteristic of the Boyd County site with a favorable characteristic of the alternatives.

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This impression is further buttressed by the fact that Table 4-47 also contains favorable comments relative to the Butte site (e.g., simple hydrogeology and low-yield wells) but not for the Nuckolls and Nemaha sites, even though the same favorable characteristics apply to one or both of the alternative sites. Finally, the Butte site is credited with the "unique characteristic" of a single zone of subsurface water and shallow impervious bedrock, positive features with respect to site performance. The Butte site also is unique among the alternatives because of its location within a 100-year floodplain, the extensive wetlands on the site, and the extremely shallow water table below the site. However, these negative characteristics of the Butte site were not cited as "unique" in Table 4-47. In light of the importance of this table to site selection and approval of the ER, the perceived manipulation of facts casts a doubt over the entire document. **Explain how Table 4-47 was prepared and why some data and observations are included and others are left out. Also, demonstrate that the trade-offs between the candidate sites are evaluated in an unbiased and fair manner.**

3.5A BASIS

> *"It is the policy of the Federal Government that — (A) each State is responsible for providing for the availability of capacity either within or outside the State for the disposal of low-level radioactive waste generated within its borders except for waste generated as a result of defense activities of the Secretary or Federal research and development activities; and*
> *(B) low-level radiacitve waste can be most safely and efficiently managed on a regional basis."*
>
> Low-Level Radioactive Waste Policy Act (LLRWPA) of 1980, Sec. 4(a)(1).

3.5B COMMENT

The impetus for passing the LLRWPA in 1980 was to alleviate LLW responsibility from the three states with operating LLW disposal facilities. The states of South Carolina, Nevada, and Washington did not want to be burdened with waste generated outside of their boundaries. Therefore, Congress provided a mechanism for regional disposal of LLW by requiring the development of compacts with one or more states. The apparent intent of LLRWPA was to dispose of LLW within these compacts without impacting neighboring states. **Given the proximity of the Boyd County site to the South Dakota border and its subsequent socioeconomic and public health impacts to South Dakota, explain why South Dakotans are not unfairly burdened with the disposal of LLW generated outside of its respective compact borders.**

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3.6A BASIS

"Assurances that U.S. Ecology and the [Central Interstate] Compact Commission will not locate a facility in a community without community consent."

1988 Amendment to Nebraska Low-Level Radioactive Waste Disposal Act

3.6B COMMENT

Public participation is documented in the ER for the state-wide screening to 111 PSA's and in the selection of three candidate sites from among the PSA's. However, the attitudes and consent of the citizens near the three candidate sites subsequent to their selection are not even mentioned in the socioeconomic and cultural characteristics of the sites. Opposition from local residents of Boyd County is clearly evident based on the formation of opposition groups such as the Save Boyd County Association, statements in the news media, and demonstrations at public meetings. **Why is the development of this project not contrary to the intent of Nebraska law? Where has community consent been demonstrated and documented before and after the final selection of the proposed site? Will a vote of the Boyd County community be conducted to ensure that community consent exists?**

3.7A BASIS

"A species is 'important' (for the purposes of this guide) if the disposal facility may affect the species or its habitat and if one or more of the following criteria applies . . . (2) the species is threatened or endangered, [Specific consideration should be given to possible impact on any species (or its habtat) that has been determined to be endangered or threatened with endangerment by the Secretary of the Interior and the Secretary of Commerce.] . . ."

NRC 4.18, Sec. 3.2

3.7B COMMENT

As stated on Page 5-40, *"The federally listed endanged wildlife species potentially occurring within the Butte study area include the peregrine falcon, whopping crane, Eskimo curlew, bald eagle, interior least tern, piping plover, and black-footed ferret. The bald eagle and the interior least tern were observed within a 3.1-mile radius of the Butte Site."*

How do you intend to ensure these threatened and endangered species will not be impacted by the Boyde County site? Why would such a sensitive issue not be addressed more fully in the ER and in the site selection?

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4.0 FACILITY DESIGN

4.1A BASIS

"The disposal site shall be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives of [Title 194] Chapter 4 will be met."

Title 194, Ch. 5, 002.02C

"This comparison [in the environmental report] of alternative designs should be conducted only for designs at the proposed site."

NRC 4.18, Sec. 2.2

4.1B COMMENT

The regulatory requirements and guidelines indicate that the interaction between the engineered and natural barriers is critical to meeting the performance objectives. Consequently, this interaction should be considered in the evaluation of alternative designs by conducting comparisons for designs at the proposed site. The alternative designs presented in the ER for disposal units and closure are generic and not based on characteristics of the proposed site. Only the proposed design was presented in the context of the preferred site. Consideration of generic alternatives implies that the natural characteristics of the site are immaterial to the performance of the proposed facility design. Is this the case? If not, site-specific design alternatives should be evaluated in terms of their relative benefits and impacts before selecting a proposed design.

4.2A BASIS

"Disposal design which uses traditional shallow land burial as used prior to 1979 is not acceptable."

Title 194, Ch. 5, 002.01

"Wastes designated as Class A ... shall be segregated from other wastes by placing in disposal units which are sufficiently separated from disposal units for other waste classes so that any interaction between Class A wastes and other wastes will not result in the failure to meet the performance objectives in [Title 194] Chapter 4."

Title 194, Ch. 5, 003.01A

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4.2B COMMENT

As described in the ER, three alternative facility designs were considered before arriving at the proposed design. None of the alternative designs provided structural separation of Class A disposal units from disposal units for other wastes, and one of the alternative designs was a subgrade structure (i.e., lined disposal trenches). Consequently, only the proposed design meets the technical design requirements for waste segregation and above-grade disposal. Three closure designs were considered (one of which was selected as the proposed design), and one of those was rejected because it would not meet regulatory requirements. **Why were facility (disposal unit) design alternatives that are not viable from a regulatory standpoint even considered? Does this approach really leave any alternative other than selecting the final proposed design?**

4.3A BASIS

> *"Facilities shall be sited, designed, operated, closed, and controlled after closure with an objective of zero-release ..."*
>
> Title 194, Ch. 4, 001

> *" 'Zero-release objective' means a goal of preventing the release of any radioactive material into the environment."*
>
> Title 194, Ch. 1, 041

4.3B COMMENT

The zero-release objective implies that a design will be selected that minimizes the possibility of release of radioactive material within the constraints "state-of-the-art" technology. It is recognized that zero release is impossible to attain because of imperfections and limitations in our current technology. However, the zero-release objective is satisfied by selecting a technologically feasible design that provides the greatest assurance of no release.

In this context, placement of incoming waste containers in reinforced concrete cubes, such as in Design Alternative 1, would seem to provide greater assurance of zero release than the final design provides. Besides added structural stability, emplacement in concrete cubes provides an additional engineered barrier. Admittedly, this design would result in a substantial increase in operating costs and could increase worker exposure (which doesn't involve release of radioactive *materials*) if the operations aren't planned appropriately. However, contrary to the conclusions of the design team, it is hard to imagine how the addition of a substantial barrier could not offer better long-term performance and not contribute significantly to achieving the overall design objective of zero-release.

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A low-level/intermediate-level waste disposal facility with a design similar to Design Alternative 1 but even more conservative has been constructed at Centre Manche, Cap la Hague, France. Further, Rogers & Associates has recently analyzed a similar design for the DOE's Defense LLW Management Program (*DOE/LLW-78T*, 1989). The DOE's design is an above-grade concrete vault system with the waste grouted in carbon steel disposal boxes and tightly stacked into the vaults; after a vault is filled, a concrete roof is poured directly on top of the disposal boxes. The French facility and the DOE's design indicate that not only is Design Alternative 1 technologically feasible but its long-term performance can be enhanced even further. **What features of the final design make it superior to Design Alternative 1 and other state-of-the-art designs in achieving the goal of preventing the release of any radioactive material into the environment?**

4.4A BASIS

> *"Void spaces between waste packages shall be filled with earth or other material to reduce future subsidence within the fill."*
>
> Title 194, Ch. 5, 003.01E

4.4B COMMENT

The proposed facility design does not mention backfilling the void spaces between waste packages in the Class A disposal cells. The regulations require this action. **Will the void spaces be backfilled as required by Title 194?**

4.5A BASIS

> *"The evaluation of impacts of alternative designs should emphasize those impacts that will vary among the alternatives, including ecological, land-use, air-quality, and socioeconomic impacts."*
>
> NRC 4.18, Sec. 2.2

> *"Discussion of alternative facility designs should consider the following, as appropriate: (1) Receiving, classifying, and processing waste; (2) Planned location and configuration of waste disposal units on the site; (3) Construction of disposal units; (4) On-site transport of waste and placement in disposal units; and (5) Construction of disposal unit covers."*
>
> NRC 4.18, Sec. 2.2

> *"A tabular summary of the various benefits and costs of the alternative designs should be presented [in the environmental report]."*
>
> NRC 4.18, Sec. 2.2

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4.5B COMMENT

Only alternative designs for the disposal units themselves and for closure are addressed in the ER. For example, alternative facility layouts were not considered. Facility layout would appear to be critical since there seems to be no contingency for disposing of 5 million cubic feet of LLW (the operating lifetime) instead of the design capacity of 2.5 million cubic feet. Further, the evaluations of these designs primarily focused on the performance objectives in Chapter 4 of Title 194. Ecological, land-use, air-quality, and socioeconomic impacts were not addressed. The evaluations of the alternative designs were essentially evolutions to the final design rather than comparisons with the final design. In total, the consideration of alternative designs is perfunctory and should be expanded to meet the guidelines issued by the NRC.

5.0 DATA SUFFICIENCY AND QUALITY

5.1A BASIS

"Each subject [in the environmental report] should be treated in sufficient depth and with sufficient documentation to permit the [Nuclear Regulatory] Commission to independently evaluate the extent of the environmental impact."

NRC 4.18, Sec. 3c of Introduction

"The objectives [of the site-characteristics chapter in the environmental report] are to describe the environmental baseline characteristics of the proposed site to determine the environmental impacts of constructing, operating, and closing the disposal facility."

NRC 4.18, Sec. 3

"Sufficient information [on the meteorological conditions] should be included to permit an independent evaluation by the NRC staff of atmospheric dispersion characteristics of the local area."

NRC 4.18, Sec. 3.3

"Sufficient information [on the hydrology] should be provided to allow an independent review of all hydrologically related design bases, performance requirements, and operating procedures important to safe and environmentally sound operation."

NRC 4.18, Sec. 3.4

"Sufficient data [on the environmental effects] should be provided for independent analysis of the effects of a disposal facility on the environment."

NRC 4.18, Sec. 5

"In the discussion of each impact [of facility operation], make clear whether the supporting evidence is based on theoretical, laboratory, on-site, or field studies ..."

NRC 4.18, Sec. 5.1.2

"A probability analysis [for accident analyses] based on existing data from operating sites and other studies may be used to assess the likelihood of such accidents occurring."

NRC 4.18, Sec. 6

"Any reports of work (e.g., ecological surveys) supported by the applicant that are of significant value in assessing the environmental impact of the facility should be included as appendices or supplements to the environmental report unless these reports are otherwise generally available."

NRC 4.18, Sec. 8.1

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5.1B COMMENTS

The analyses of the environmental impacts of the proposed facility depend on carefully establishing the baseline environmental conditions. The regulatory guidance provided by the NRC repeatedly emphasizes the need for information on the preexisting conditions that is sufficient to permit an independent evaluation of the environmental conditions and impacts. The list of comments that follows are specific areas in which the information was either insufficient or lacked the quality for this independent assessment. In many cases, the baseline data presented in the ER for the Boyd County site are not sufficient to warrant confidence in the analyses of the projected impacts. In some cases, they even appear to have been favorably slanted and not conservative.

GEOLOGY/HYDROGEOLOGY

1. U.S. Ecology mentions the Dakota Aquifer as through it is the only aquifer considered in the assessment. Why did the applicant choose not to mention the sand zone, the late cenozoic deposits, or the rubble zone?

2. Are there any inactive faults in the vicinity of the Boyd County site? Even the presence of inactive faults was noted in the characterization of the Nemaha County site. The Ponca Creek and Keya Paha/Niobrara River valleys are surprisingly parallel and linear physiographic features. Lineaments such as these valleys often express underlying structural features such as faults. In a Geological Society of America abstract, Dr. George Shurr (St. Cloud State University, St. Cloud, Minnesota) postulates the presence of a basement fault below the Ponca Creek valley. What evidence excludes the possibility that either or both of these valleys are not fault zones? If these valleys are fault zones, what are their anticipated impacts?

3. Where was the epicenter of the largest reported seismic event within 200 miles of the Boyd County site? Only the date (November 15, 1877) and Modified Mercalli intensity (VII–VIII) of the event are given in the ER. Also, what is the estimated Modified Mercalli intensity at the Boyd County site of the New Madrid events of 1811 and 1812?

4. Site and near-site characterization and groundwater flow path determination are necessary because total containment of radioactive waste in vault-type disposal facilities for prolonged periods of time may not be practically achievable with available technology. Hydrogeologic characterization both on-site and off-site is necessary to predict time of containment travel to potential groundwater discharge areas. Any time of travel calculations should account for climatological variations which may result in changes in groundwater gradient and elevations. Also, potential radioactive concentrations at the groundwater discharge areas should be estimated. Why has this type of information not been provided by U.S. Ecology?

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5. Chapter 5 contains insufficient detail for an independent expert to assess the validity of conclusions surrounding the geologic and hydrologic baselines. A detailed topographic map should be provided to assess drainage. A site-specific/region-specific geologic cross-section should be provided rather than a generalized schematic cross-sectional diagram (i.e., multiple cross-sections using data from drill holes should have been provided).

6. There is no substantiation for conclusions that groundwater recharge is primarily from infiltration of direct precipitation rather than subsurface inflow. Also, what is the areal distribution of the site's recharge?

7. The June-March precipitation reported in the ER is 62 percent of the long-term, average regional precipitation for the June-March period. Why were drought conditions considered reflective of baseline meteorological conditions? How much would the water table rise under a period of average or above-average precipitation in the area?

8. Page 4-208: Why is there a subsurface water statement for the Butte site but not for the Nuckolls site?

9. Page 5-3: There is a variable contour interval shown on the map. Because all contours are not labeled on the map, it is not possible to interpret land-surface elevations across the entire site. Please explain this lack of detail. How can elevations across the entire site be determined?

10. Page 5-56: It is stated that *"A more detailed description of geology and seismology can be found in the applicant's SAR, Section 2.3."* Why is the SAR not available to assist the review of the ER?

11. Pages 5-61 and 5-77: It is stated that *"Regional correlation of the site stratigraphy has not been definitely established."* It is stated on Page 5-77 that *"The water-bearing Ogallala sandstones and sands found in the high plain sections of Boyd County are not present beneath the site."* These two statements conflict with one another. If regional correlation is in question, then how can the applicant conclusively state that the water-bearing Ogallala sandstones and sands are not present beneath the Boyd County site?

12. Page 5-77: It is stated that *"Based on those measurements, the water table gradient is approximately 0.0036, which is equivalent to 19 ft/mile to the north-northeast, as shown in Figure 5-21."* Figure 5-21 is presented on Page 5-78 and is intended to illustrate the configuration of the water table surface. However, the above quoted statement and the water table surface as shown in Figure 5-21 are in conflict with one another. Figure 5-21 shows that shallow groundwater movement is as stated for most of the site. But in the northeast corner of the site, the figure shows groundwater movement to be in exactly the opposite direction (to the southwest) stated by the applicant. According to Figure 5-21, groundwater under the site would move toward a trough in the

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groundwater surface (less than 1,798 ft in elevation) in the northeast portion of the site. The direction of groundwater movement away from this low area is not indicated on the figure, nor is it described in the text of the report. This discrepancy highlights the need for off-site investigation in order to adequately understand groundwater movement beneath the site and to predict potential impacts on surrounding groundwater and surface water. How does the applicant explain this discrepancy? Do you plan off-site investigations to characterize the groundwater movement? If not, why not?

13. Page 7-71: Please discuss the potential for land subsidence and its impact upon the structural integrity of the waste containment system. Please provide a description of the surficial fines at the Boyd County site.

14. Pages 10-10 and 10-11: Are these figure titles mismatched?

LAND AND WATER USE

1. The storage and space locations and resulting impacts of 1.4 million cubic yards of soil for borrow material is not described. Is this the amount of fill needed to dispose of 2.5 million cubic feet of waste? Similarly, impacts of the water needs for operations on the competing rural needs are agribusiness, fire control, and fire control, and domestic supply, and are not adequately addressed.

2. Are impact assessments based on 2.5 million cubic feet of waste or 5 million cubic feet of waste? For instance, the discussion on Page 1-4 and 1-5 suggests the assessments are based on 2.5 million cubic feet of waste. If the basis is not 5 million cubic feet for all analyses, then explain why the ER is not misleading, incomplete, or internally inconsistent.

3. Page 4-19: How could a site selection be made without conducting a groundwater use survey on each site?

4. Page 4-73: Why is nothing stated about the amounts and yields of groundwater at the Nemaha site? Where do residents in the vicinity of the Nemaha site get their water? Is there a more serious threat to groundwater at the Nemaha site than the Boyd County site?

5. Pages 6-12 and 7-23: What is the location of the borrow pit? If it is off-site, will this land be purchased outright or will the removed material be paid for? If it is purchased, will this land revert to state ownership at the same time as the LLW site? How will the borrow pit be stabilized during its operational life? Will the borrow pit be reclaimed after site closure?

6. Page 6-13: Why is the retention pond release statement not consistent with the statement made on Pages 7-44 and 7-48? Why is there not a quantitative

analysis of the flow regime for both natural flow and retention pond flow before and after total construction? Will the water regime affect the wetlands?

7. Page 6-41: What are the sewage waste flows and impacts for the number of employees? What is the positioning of the drain field and soil suitability at the site for the septic system? Describe the impact of the septic drain field on the groundwater.

8. Page 6-43: What are the requirements and impacts as they relate to fire and domestic uses? What are the impacts to the community or rural water system supplying the water?

9. Page 7-18: What will be the effect on the City of Butte's water supply if the disposal facility taps into it?

10. Page 7-46: The water use statement assumes no impact on the 320-acre site, but what about the off-site impacts?

11. Page 7-66: Contradictory statements concerning unrestricted and restricted land use. If the point of decommissioning is to allow unrestricted land use, then continued restriction of land use should not be considered part of the decommissioning phase. Please explain.

ECOLOGY

1. Why did the surveys not include review of SCS cover maps, aerial photos, landsat, or maps other than topographic quads?

2. Concerns cited for the Nemaha site such as lack of quantitative data, sampling methods, sampling locations, wetlands definitions, mist netting, and pit fall trapping are applicable to this section.

3. Could releases of radionuclides or radioactive mixed waste contaminants reach Ponca Creek and eventually the Missouri River?

4. Apparently no mist netting was ever conducted in attempts to identify Chiropterans (bats). Crepuscular observations are questionable at best to identify bats. Also, live traps and snap traps are ineffective in capturing Insectivores (shrews). Apparently no attempts were made to pit-fall trap these mammals. Explain rationale for techniques used to observe mammals.

5. Is the Boyd County site the least desirable of the final three sites considered based on the overall biological species diversity?

6. Provide detailed discussion of the radiological food web pathway and ecological impacts for the Boyd County site and study area from airborne or groundwater transport of radionuclides.

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7. How will rerouting drainage and constructing sediment barriers alter the character of the wetlands, and how will expansion to a 5-million cubic-foot capacity not affect wetlands?

8. Explain why the wetland definitions and description do not follow U.S. Fish and Wildlife Service conventions.

9. Why was the Natural Heritage Inventory Database not used for species occurrences and species information?

10. Given the limited data and information supplied, the Boyd County site seems to be the least desirable of the three sites considered based on biological/ecological factors. This judgement is based upon the occurrences of wetlands, species richness (e.g., raptors, threatened and endangered species, Ponca Creek fauna, and Niobrara fauna), and potential ecological damage to the drainages of both Ponca and Niobrara in the event of an accident or incident. Explain the apparent discrepancy in judgement.

11. Page 1-2: The ER does not address the problem of wetland delineation that seems apparent from the facility layout. Therefore, the Safety Analysis Report (SAR) is needed to ensure facility layout does not disturb any wetlands. How can the ER and SAR be reviewed sequentially?

12. Page 4-28: *"Appendix D lists all species occurring on the Nemaha County site."* Does Appendix D refer to the study site, the sample site or what? Please provide support or references for this claim.

13. Page 4-28: Why are vegetation types and plant associations considered equal when they are different terms?

14. Page 4-34: *"Impact could be mitigated by replacement"* Will replacement be acre for acre, type for type, or in kind replacement of habitat value?

15. Page 4-34: Explain why there cannot be wetland avoidance construction at the Nemaha site when it is possible at the Boyd County site.

16. Page 4-50: Tables should include number observed and level of effort in addition to relative abundance.

17. Page 4-51: *". . . elevated nitrite and nitrate levels in the water."* Please provide quantification (e.g., How elevated? What were the readings?).

18. Page 4-139: How many bald eagles were observed within the 16 mile radius?

19. Page 5-23: Explain why the 1989 National Wetlands Inventory was not used in lieu of the late 1970's data. Also, whose vegetation analysis is being referenced?

20. Page 5-32: Note that four species of raptors breed in the study area (Sandhill Cranes migrate through the area and sometimes Whooping Cranes accompany them on their migration).

21. Page 6-34: U.S. Ecology talks about site drainage and erosion control, but they fail to outline the issue of increased runoff from the addition of buildings, roads, and parking lots and the resultant change in runoff to the wetlands. Please provide the rationale for not impacting wetlands.

22. Page 7-6: Aquatic habitats and surface runoff are discussed. If surface runoff is diverted, what about the natural recharge to the wetlands? Are the wetlands impacted negatively?

23. Page 7-49: The applicant mentions the site drainage system, but does not enlighten the reader as to what exactly this system is. It is also stated that releases form the class A and the Class B and C retention ponds will eventually reach the wetlands. How will this impact the wetlands? Due to the large size of the Class A and Class B and C retention ponds (6 acres and 1 acre, respectively), how will migrating birds such as geese and ducks be impacted?

24. Narrative states that site characterization studies are described in Sec. 10.1.3, but 10.1.3 describes the Boyd County site only. Please clarify why other candidate sites were not included.

25. Page 10-15: *"Property access was one of the determinants in identifying field survey locations."* What were the other determinants?

26. Page 10-15: *"Major biological groups were selected for sampling because existing data are limited."* What is the definition of *"Major biological groups."* How is sampling intended to gather information when existing data are limited?

27. Page 10-15: *"representative species were selected for radiological baselines."* How was this done and which species were selected?

28. Page 10-26: *"The ecological monitoring program during operations . . . frequency of sampling during operations will be reduced to about once every 5 years."* This proposed schedule is inadequate and irresponsible. Please explain why sampling during operations is not at least biannual.

SOCIOECONOMIC

1. South Dakota lies within both the 6.2 miles and 30 miles "definitions" of affected populations. The agriculture, commerce, housing, labor base, and property values of South Dakota are potentially impacted by the proposed facility. How are these impacts assessed? Please provide documentation and

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references. What compensatory assurances, if any, will be extended to individual "South Dakotans," and South Dakotan communities who are affected by the proposed facility?

2. It appears that the 6.2 miles definition is being applied to determine the affected population. Given that: (1) airborne transport (a widely dispersive mechanism) is the most viable means for affecting the population through release of nuclides, and (2) the rural nature and sparse population around the proposed disposal site, why isn't the 50 km definition more applicable?

3. What percentage of the labor force is expected to be derived from or reside in South Dakota, and what will their skill base be? Also, please provide the basis for your projections and explain why the method applies to the specific geographic/demographic patterns of the area.

RADIOLOGICAL

1. The fire and chemical scenario is lacking in its evaluation. Class A waste is considered unstable because it has a high quantity of "garbage" which could produce higher gas generation within the canisters than calculated for Class B and C. Also, heat usually accelerates gas generation causing a potential explosive situation during a fire which did not appear to be considered in the evaluation. It also is unusual that they concluded that the gas generation rate was a non-concern considering the problems engineers are having in determining that rate in canisters to be stored at WIPP in New Mexico. Please explain these omissions and oversights.

2. The response actions to an accident were too generic. Please supply more specific information.

3. Do these doses consider that Boyd County and surroundings are active hunting areas where wild game is a non-standard pathway to humans? Note that wildlife on and around some facilities for nuclear wastes disposal (e.g., Hanford) have been found to have significant contamination. Please describe how wildlife figure into dose concentrations and whether or not hunting, fishing, etc., will be restricted.

4. Page 6-9: It is stated that at closure of the site, all underground buildings will be decommissioned and buried. Will there be a radiation survey of these structures? If there is radiation contamination, will these structures be decontaminated before decommissioning and backfilling?

5. Page 7-28: Why have potential contamination doses not been calculated for the local game animals? How can the human exposure models be accurate if this potential exposure pathway is not considered?

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6. Page 7-31 and 7-41: Are ground/surface water and aquatic animal ingestion pathways considered in the human exposure models for various radionuclide release scenarios? What are the potential human and environmental exposures if there is a complete loss of the groundwater protection measures?

7. Page 7-31: Are prevailing winds considered in the airborne release scenarios and calculated as the yearly average wind direction, seasonal average wind direction, or worst-case wind velocities and directions?

8. Page 7-31: In the discussion on the radiological impacts on humans, the applicant states that groundwater and surface water are not considered potential pathways of normal operation. They fail to take into consideration the possibility of leakage from an accident/incident, substandard package, or spill to the aquifer during normal operations. Please explain this omission.

9. Page 7-43: Why are there no potential human exposure models based on releases from the mixed waste cell?

10. Page 7-78: Analysis ignores the fact that nuclides could sorb on to mobile colloids. Therefore, the use of K_d values of zero is not necessarily conservative. Please explain.

11. Chapter 8 states that *"accidental releases have a low probability of occurrence,"* but there is no indication what order of magnitude constitutes a low probability. Further, no data or references from existing disposal facilities are provided to support this assessment. Please provide quantitative estimates of the annual probabilities of the accident scenarios and substantiation for these probability estimates. The assertion that the accidents evaluated in the ER bound off-site radiological impacts also lacks substantiation and credibility. In fact, it seems incredible that the annual dose estimated for the "worst-case" accident (0.5 mrem) is less than the maximum annual dose estimated for normal operating conditions (2.4 mrem). Please explain this apparent contradiction and substantiate the assertion regarding the bounding accidents.

MONITORING

1. The locations and numbers of groundwater and air quality monitoring stations are not clear and does not appear to have a scientific basis. The locations seemed to be determined by "property access" rather than a systematic scientific basis. Please describe, in detail, the considerations, models and methodologies for optimizing these locations. More importantly, please comment on why deep well monitoring stations are unnecessary where both DOE and EPA require such measures at similar low-level waste (LLW) facilities (to verify that no contamination of major sources of groundwater has occurred).

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2. Please provide additional information on the actual background atmospheric and radiological data that was collected, the types of monitors used to collect this data, and the QA/QC procedures that were used to ensure quality data was collected.

3. Page 6-39: Why is not the placement of the groundwater monitoring wells noted in the text and placed in Figure 6-11? Is it practical to detect any off-site migration? What is a regular sampling basis? What is the rationale for parameters and frequency of sampling?

4. Page 6-39: In a very short discussion, the applicant simply mentions that monitoring wells will be installed after closure. Are there to be monitoring wells during the operation phase of the facility? If not, why? How are potential leaks to the water table to be monitored in the event of an accident or failure of integrity of the barrier system?

5. Page 6-41: What is the 25-year storm record and the pipe size needed to accommodate the flow?

REGULATORY

1. Page 1-5: Does approval of the ER for this licensing process alleviate going through an environmental assessment for the mixed waste facility at a later date? How does this comply with Nebraska's rules for compliance with the National Environmental Policy Act and the associated regulations in 40 CFR 1501-1508?

2. Page 1-6: If decommissioning does occur, what is the anticipated waste volume? What will happen if the facility is not large enough to handle the waste?

3. The statement that *"there are no regulations that specifically address accident dose limits"* (Page 8-6) is inconsistent with the zero-release objective and the individual dose limits set forth in the performance objectives specified in Title 194. Please explain why dose limits in Title 194 do not apply. Comment on our understanding of the performance objectives in Title 194, to wit: The zero-release objective is the design basis for *expected* facility performance, while the limits of Title 194, Chapter 4, 002 apply to releases to the general population in effluents at all times and circumstances including off-normal operations and accidents.

OTHER

1. Please provide documentation of contact with all other compacts referring to disposal of LLW generated within the Central Interstate Compact?

2. In addition to the reportable release quantities required by the State of Nebraska, will a public warning or reporting system be available to immediately advise the public if there is an uncontrolled release of radionuclides from the facility?

3. Why was Nebraska selected as the host state if the evaluation criteria (see Host State Recommendations by U.S. Ecology and Bechtel National, Inc.) involved (1) environmental conditions, (2) waste generation considerations, and (3) transportation considerations? Is not the centroid for reactor-generated LLW in Central Arkansas (as per *CIC LLW Site Exclusionary Screening Study* by Dames and Moore, 1985)?

4. In the selection of the first host state by the Central Interstate Compact, transportation from waste generators to disposal facilities was one of the three key factors considered in the selection (although the transportation factor was given slightly less weight than the other two factors). In the evaluation of the candidate sites in Nebraska, the only transportation characteristics that appear to have been considered were access to highway and railroad routes. Why wasn't transportation routes and distances to waste generators included in the evaluation of transportation impacts?

5. How can a site selection be adequately made without 1 year of data?

6. Why is there not a cost/benefit comparison between the three candidate sites?

7. Who is responsible for the transportation of low-level waste?

8. Provide a description of the transportation corridors, including non-interstate roads and the appropriate measures needed to ensure adequate response to accidents.

9. Page 4-67 and 4-159: Are the data for analysis mentioned for both sites along with test methods available in the SAR? If not, are they available for QA/QC inspection? Concern exists for settlement of the structure; especially at the Nuckolls site. How does the construction methodology differ from each site? What would the cost be on a comparative basis? How does this relate to environmental and public health protection? Why are not risk analysis conducted for all sites when comparing geologic, groundwater, and pathway analysis?

10. Page 6-38: Why do the retention ponds <u>not</u> have geotextile liners?

11. Page 7-71: Provide the data and supporting documentation on the tests/evaluations of the structural integrity assessment.

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Bechtel National, Inc.
Systems Engineers — Constructors

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APR 21 1989

Central Interstate LLRW Compact Commission
3384 Peachtree Road, N.E.
Suite 260
Atlanta, GA 30326

Attention: Mr. Ray Peery, Executive Director

Subject: Bechtel Job 19185, Central Interstate Compact LLRW Facility
US Ecology Contract No.: TBD
MONTHLY PROGRESS REPORT - FEBRUARY 1989
Subject Code: 1200

Dear Mr. Peery:

In accordance with Mr. R. Paton's instructions, enclosed is the Monthly Progress Report - February 1989, for the currently assigned work for Central Interstate Compact LLRW Facility. This report reflects combined BNI work tasks with US Ecology's activities to form a composite progress report for submittal to the Commission. According to your instructions, eighteen (18) copies have been provided for your convenience in submitting the report to the Commission.

If you have any questions, please let me know.

Sincerely,

J. F. Dettorre

Joseph F. Dettorre
Project Manager

JFD/MKB/vap:2177G

Enclosures: (18)

1560 o BNI presented to John DeOld of US Ecology and Jay Ringenberg of NDEC during October, 1988 a proposal for licensing the Mixed Waste Cell under Subpart "X," 40 CFR 264 as a miscellaneous unit. NDEC agreed to review the BNI proposal and provide any comments to BNI prior to making a USE/BNI/NDEC proposal to EPA Region VII headquarters. The concurrence by NDEC and EPA on the proposal is critical in order to proceed with the mixed waste disposal cell. No comments have been received so far on the Mixed Waste Proposal from NDEC. Receipt of comments by the NDEC is needed to continue work in this area.

1560 o The Regulatory Matrix, Identification of Agencies with review and approval responsibilities for Permit and License Application was issued in draft form to NDEC. The Matrix has been used as the basis for a draft MOV between NDEC and NDOH on division of responsibility for two agencies. BNI is awaiting comments from NDEC and appropriate agencies in order to continue work on the matrix.

1560 o Work continues on establishment of format and content for Safety Analysis Report, Environmental Report and Hazardous Waste permit application.

1560 o Preliminary work on identifying regulatory requirements for NESHAP application for emission of radionuclides in accordance with 40 CFR 61 continues.

1560 o Following the announcement of the candidate sites for detailed characterization, USE/BNI Project Team identified a potential problem related to wetlands on the Boyd County site. Preliminary discussions with the State and the Corps of Engineers in Omaha indicated that while the permitting and licensing of the site might be very complex due to the likely presence of wetlands (as indicated on the USGS quad maps and soil classification maps,) this was not a fatal flaw for the site.

1560 o At Waste Management'89 in Tucson, AZ, a paper on the use of the Regulatory Matrix by Rich Paton, Charles Cawley, and Jay Ringenberg was presented by the latter.

1710 o Studied alternative layouts for both the higher activity Class A vault and the mixed waste vault. Also continued work on the development of the project Design Criteria.