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**COVINGTON & BURLING**

1201 PENNSYLVANIA AVENUE, N. W.

P. O. BOX 7566

WASHINGTON, D. C. 20044

(202) 662-6000

TELEX: 89-593 (COVING WSH)

TELECOPIER: (202) 662-6288

CABLE: COVING

**RICHARD A. MESERVE**

DIRECT DIAL NUMBER

(202) 667-5304

*received 03-15-88*  
*40-2061*  
*PDR/LPDR*  
VIRGINIA OFFICE  
2000 CORPORATE RIDGE  
McLEAN, VIRGINIA 22102  
(703) 749-3860

March 10, 1988

BY HAND

Dr. Jerry J. Swift  
Uranium Fuel Section  
Fuel Cycle Safety Branch  
Division of Industrial and  
Medical Nuclear Safety, NMSS  
U.S. Nuclear Regulatory Commission  
Mail Stop 6G22  
Washington, D.C. 20555



Re: Draft Supplement to the Final Environmental  
Statement Related to the Decommissioning of  
the Rare Earths Facility, West Chicago,  
Illinois (NUREG-0904, Supp. No. 1)

Dear Dr. Swift:

On February 2, 1988, you requested that Kerr-McGee  
Chemical Corporation submit information to assist the staff in  
its analysis of comments on the above-captioned Draft Supple-  
ment. I enclose a copy of the Kerr-McGee response.

Please feel free to contact me if I can provide any  
further information.

Sincerely,

*Richard A. Meserve*  
Richard A. Meserve

Counsel for Kerr-McGee  
Chemical Corporation

Enclosure

cc: Leland C. Rous.  
Merri Horn  
Steven Tsai  
Stephen H. Lewis



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C PDR

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*addit info*

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BEFORE THE UNITED STATES  
NUCLEAR REGULATORY COMMISSION



Draft Supplement to the Final  
Environmental Statement Related  
to the Decommissioning of the  
Rare Earths Facility, West  
Chicago, Illinois  
(NUREG-0904, Supp. No. 1)

Dkt. No. 40-2061

SUPPLEMENTAL COMMENTS BY  
KERR-McGEE CHEMICAL CORPORATION

Ivan L. Denny  
Edwin T. Still  
John C. Stauter

Peter J. Nickles  
Richard A. Meserve  
Sonya D. Winner

KERR-McGEE CHEMICAL CORPORATION  
123 Robert S. Kerr Avenue  
Oklahoma City, OK 73125  
(405) 270-3817

COVINGTON & BURLING  
1201 Pennsylvania Ave., N.W.  
P.O. Box 7566  
Washington, D.C. 20044  
(202) 662-6000

Counsel for Kerr-McGee  
Chemical Corporation

March 10, 1988



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#### EXHIBITS

1. Report by Senes Consultants Limited on Dust Emissions During the Action Period
2. Excerpts from NRC Brief in Quivira Mining Co. v. NRC, No. 85-2853 (10th Cir.)
3. Press Reports on State Efforts to Identity a New Low-Level Radioactive Waste Site
4. Excerpts from Central Midwest Interstate Low-Level Radioactive Waste Compact, Regional Management Plan (undated draft)
5. Zoning Map and Excerpts from City of West Chicago Zoning Ordinance
6. RAECOM Flux Calculation
7. Press Report on the "State of the City" Speech by the Mayor of the City of West Chicago

Draft Supplement to the Final  
Environmental Statement Related  
to the Decommissioning of the  
Rare Earths Facility, West  
Chicago, Illinois  
(NUREG-0904, Supp. No. 1)

SUPPLEMENTAL COMMENTS BY  
KERR-McGEE CHEMICAL CORPORATION

1/ The submission filed by Kerr-McGee on October 1, 1987, is referred to herein as "Kerr-McGee Comments."

Part I sets out a response to the staff's specific inquiries. Part II includes a discussion of certain generic issues that have been raised by several of the commenters. Finally, in Part III, Kerr-McGee sets out its response to many of the specific issues that have been raised in the comments. Kerr-McGee has not attempted to provide a comprehensive or exhaustive response to the comments, but rather has sought to address the most significant issues. Of course, Kerr-McGee stands ready to provide further information on any of the matters that are discussed in the comments.

I. INFORMATION REQUESTED BY THE STAFF

The staff has requested that Kerr-McGee provide information on three specific issues. We set out each request and the Kerr-McGee response.

Staff Request:

The total volume of material moved (or to be moved) from the Sewage Treatment Plant to the West Chicago site. In addition, provide the radiological characterization of the material.

Response:

The excavation of the Sewage Treatment Plant is now complete. An estimated 57,000 cubic yards of material were excavated from the plant and transported to the Kerr-McGee

facility.<sup>2/</sup> Average concentrations of Th-232, U-238, and Ra-226 are 298.6, 6.8, and 53.1 pCi/g, respectively. These values were determined on the basis of random samples collected daily during the excavation process and from samples collected from the facility storage pile.

Staff Request:

Detailed work schedules for the onsite activities included under your decommissioning proposal. Include information on the duration, area involved (location and size), amount of material included for each specific activity, and type of equipment.

Response:

A detailed week-to-week work schedule has not been developed by Kerr-McGee. Based on conversations with the staff, however, we understand that the request is intended to provide information that will permit an estimate of the radiological dose to the nearest offsite resident during the action period. Kerr-McGee has developed information to enable this calculation to be performed. Indeed, a consultant (Senes Consultants Limited) has completed the calculation of the dust emissions during the action period and we set it out for the staff's use as Exhibit 1.

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<sup>2/</sup> The volume of material excavated from the Sewage Treatment Plant is very close to the estimate that Kerr-McGee submitted to the NRC with its comments. See Kerr-McGee Comments, Table 4 (Oct. 1, 1987) (44,300 cubic meters, or roughly 58,000 cubic yards).

Kerr-McGee intends to construct the cell using equipment of the type conventionally used in the construction of earthen embankments. The list of the equipment that is proposed to be used is shown in the Kerr-McGee Engineering Report, Volume IX, Section 9.4.1.4. Of course, experience may show the need to add or substitute other equipment to perform the work efficiently.

For purposes of calculating offsite radiation impacts, it is necessary to know only the volume of the waste that will be handled. The waste volumes are listed in the Kerr-McGee Engineering Report, Volume IV, Table 4.2, but must be revised to reflect the material that has been brought to the site from the neighborhood cleanup and from the Sewage Treatment Plant. The revised volumes are set out herein on Table 1.

In order to calculate the offsite dose, it is necessary to know the time required for the handling of the wastes. Based on the volume information, it is possible to make a reasonable estimate of this number. For example, Kerr-McGee plans to use a backhoe excavator with a 3-cubic-yard bucket to excavate the contaminated soil from the Factory Site. With this type of equipment, it may be calculated that the contaminated soil on the Factory Site, which constitutes approximately 183,000 cubic yards of



material, will be excavated in 229 8-hour days.<sup>3/</sup> Similar calculations may be undertaken for each of the other waste categories.

In order to perform the dose calculation it is also necessary to know the period during which construction activities will take place. Kerr-McGee plans to construct the disposal cell over four construction seasons. The first, second, and third seasons will last approximately 32 weeks each. A 20-week cessation of work will occur each year because of the adverse weather conditions normally encountered at the site during winter. The fourth construction season is projected to last 24 weeks. During this last and shorter season, the temporary cell cover will be removed and construction of the permanent cell cover will take place. See Kerr-McGee Engineering Report, Volume IX, Section 9.4.2.5.

The construction sequence is discussed in the Kerr-McGee Engineering Report, Volume IX, Section 9.4.2, and is described in detail on Drawing No. SK-274, the Waste Stabilization Site Civil Construction Sequencing Logic Diagram. Guided by the construction sequence, the waste handling can be allocated to the various construction years.

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<sup>3/</sup> Kerr-McGee estimates that the backhoe could complete approximately 100 cycles/hour. If the bucket will hold 3 cubic yards and the backhoe is assumed to operate at 33 percent efficiency, the backhoe could excavate 100 cubic yards/hour. The excavation will thus require roughly 1,830 hours, or 229 8-hour days.



A reasonable allocation is set out on Table 1. A construction time schedule for each year is set out in Figure 1.

Based on this information, Kerr-McGee estimates that the radiological impacts during the action period on the nearest neighbor to the site will be slight. In particular, as shown by Exhibit 1, onsite stabilization should readily comply with the dose requirements of 40 C.F.R. Part 192 (the 25 mrem rule).

Staff Request:

Information on the financial surety arrangements to be made under Criterion 9 & 10 of 10 CFR 40, Appendix A.

Response:

The financial surety requirements of Criterion 9 should not properly be applied in the West Chicago circumstances.<sup>4/</sup> As drafted, the criterion requires financial surety arrangements to be established by each mill operator "prior to the commencement of operations." The criterion was obviously intended for application to new mill tailings sites, for which decommissioning and stabilization plans are to be examined and approved before site operations begin, as well as to existing operating facilities for which such plans are

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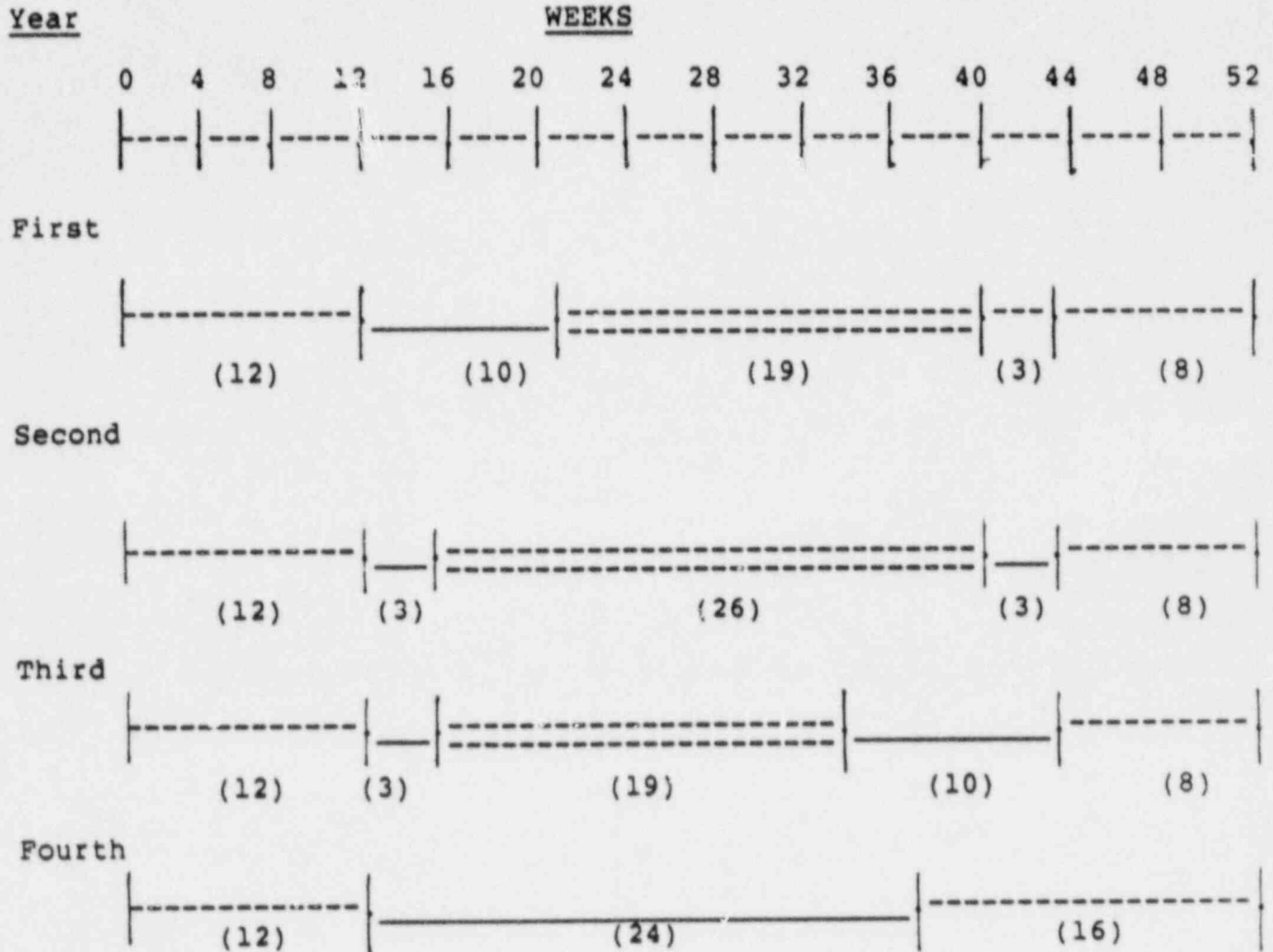
<sup>4/</sup> Criterion 10 by its terms does not deal with financial surety requirements. It requires a payment at the termination of the mill license to the United States or to an appropriate state agency to cover the costs of long-term surveillance. We understand the NRC's reference to Criterion 10 to reflect the fact that any surety to be established pursuant to Criterion 9 is to encompass this element of cost.

TABLE 1  
WASTE HANDLING - TIME REQUIREMENTS  
(Estimate)

Material Type and Source	Estimated Volume (Cubic Yards)	Number of 8-Hour Days			
		Yr. I	Yr. II	Yr. III	Total
ON SITE MATERIALS					
<u>Factory Site</u>					
Cement-Asbestos (Transite)	325	--	20	--	20
Reinforced Concrete	6,300	6	8	6	20
Block and Brick	7,865	--	--	25	25
Misc. Rubble	1,200	1	2	1	4
Steel Tanks	30)				
Steel Pipe	320)	9	13	--	22
Steel (Struc. & Equip.)	2,390)				
Contaminated Soil	183,000	57	115	57	229
<u>Intermediate Site</u>					
Contaminated Soil	7,500	--	--	10	10
<u>Disposal Site</u>					
Tailings	24,500	--	31	--	31
Pond Sediment Pile	5,000	7	--	--	7
Pond 2,3,4,5, Sediments	13,000	25	8	--	33
Pond 1 Sediments	27,000	--	68	--	68
Soils	35,000	13	18	13	44
Neutral./Stabil. Agents	N/A				
<u>Miscellaneous</u>					
Rare Earth Chemicals	450	5	--	--	5
Incinerator Ash	450	5	--	--	5
Temporary Detention Pond	2,500	--	--	4	4
OFF SITE MATERIALS					
Reed-Keppler Park	15,000	--	38	--	38
Neighborhood Cleanup	35,000)	24	72	--	96
Sewage Treatment Plant	57,000)				
TOTAL NUMBER OF 8-HOUR DAYS		152	393	116	661

Figure 1

CONSTRUCTION TIME SCHEDULE

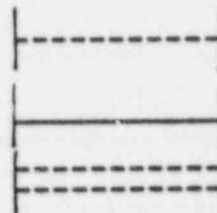


LEGEND:

Non-Construction Period of Year

Construction Period

Construction Period Handling  
Materials (Cont. & Non-Cont.)



required for continued operations. In effect, the criterion requires a demonstration that decommissioning and stabilization will be completed as a condition for the issuance or maintenance of the facility's license. The criterion serves to assure the protection of the public in the event that the financial condition of the licensee changes between the time of licensing and the time of stabilization.

Obviously, the criterion cannot be applied literally in the West Chicago circumstances because there will be no commencement of operations; milling activities at the site ceased long ago and will never be resumed. Moreover, a consideration of the purpose of the requirement shows that it has no sensible application to West Chicago. As the criterion itself provides, the obligation to establish a surety cannot conceivably be triggered until the Commission approves Kerr-McGee's stabilization plan.<sup>5/</sup> But once such an approval is granted, Kerr-McGee intends to proceed immediately to commence onsite stabilization. There is thus no need for the protection that a surety would provide to assure that funds for stabilization will remain available over time. Indeed, the imposition of the requirement would likely serve only to

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<sup>5/</sup> The criterion provides that the surety arrangements are to "be based on Commission-approved cost estimates in a Commission-approved [decommissioning and stabilization] plan."

increase the cost of stabilization with no balancing purpose or benefit.

If it were determined at the hearing on the Kerr-McGee plan that Kerr-McGee is obligated to meet the surety requirement, then Kerr-McGee would of course comply. In such a circumstance, Kerr-McGee would likely achieve compliance through application of a financial test based on the assets of the Kerr-McGee Chemical Corporation.<sup>6/</sup>

## II. GENERAL ISSUES RAISED IN THE COMMENTS

There are some major themes that are repeated in several of the comments on the DSFES. The commenters seem to be confused about the proper application of relevant NRC requirements, the purpose of the staff's assessment of ground-water issues, and the justifications for the staff's failure to consider disposal at a future Illinois low-level waste site.

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<sup>6/</sup> Cf. 10 C.F.R. §§ 140.14(a)(2), 140.14(b); 40 C.F.R. § 264.143(f) (financial assurance under RCRA). The staff has indicated to the Tenth Circuit that satisfaction of the surety requirement through a financial test may be acceptable. Brief of Respondents, *Quivira Mining Co. v. NRC*, No. 85-2853, at 43 & 46 n. 25 (10th Cir. July 10, 1987). Relevant portions of the staff's brief are set out as Exhibit 2.

A. Application of the Appendix A Criteria

Several commenters, including the City of West Chicago, the Illinois Department of Nuclear Safety, and the Illinois Attorney General, argue that the DSFES improperly fails to reject the West Chicago site on the ground that it does not fully satisfy the criteria established by the NRC for the disposal of uranium mill tailings. 40 C.F.R. Part 40, Appendix A. In particular, these commenters argue that the West Chicago site fails to meet the siting requirements of Criterion 1, and that disposal in West Chicago would be inconsistent with Criterion 3's "prime option" of disposal below grade.<sup>7/</sup> These comments misconstrue the purpose and meaning of these criteria in several respects.

First, the NRC has emphasized several times that those aspects of the Appendix A criteria that relate to the siting of a disposal site (as opposed to criteria relating to the design of tailings impoundments) apply only to new sites. See, e.g., 48 Fed. Reg. 35352 (Aug. 4, 1983) ("siting only applies to new sites or new disposal areas"); 45 Fed. Reg. 65523 (Oct. 3, 1980) (objectives applicable to new sites,

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<sup>7/</sup> The City of West Chicago also criticizes the Kerr-McGee disposal plan for failing to provide for a cover over the wastes of at least three meters. This requirement was deleted from Appendix A more than two years ago. See 50 Fed. Reg. 41852 (Oct. 16, 1985). Other regulatory documents cited by the City, such as the Branch Technical Position, have been superseded by the Appendix A criteria and have no independent legal relevance to the issues addressed in the DSFES.



including remoteness from people and below-grade disposal, "may not be met to the same degree at an existing site as at a new site"). The legislative history of UMTRCA is clear that Congress did not intend for existing sites to comply with all of the rigorous requirements that could reasonably be imposed on new sites,<sup>8/</sup> and the NRC has defended the Appendix A criteria in judicial review proceedings by emphasizing that the siting criteria will not be strictly applied to existing sites.<sup>9/</sup> Thus, even if the West Chicago site failed to meet completely every aspect of the criteria, that fact, standing alone, would not disqualify it for disposal of the West Chicago wastes.<sup>10/</sup>

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8/ See H.R. Rep. No. 1480, 95th Cong., 2d Sess., Part 1 at 16, Part 2 at 44, reprinted in 1978 U.S. Code Cong. & Adm. News 7433, 7438-39; 124 Cong. Rec. H12969 (daily ed. Oct. 14 1978) (statement by Rep. Udall); see also 127 Cong. Rec. S2973 (daily ed. March 30, 1982) (statement by Sen. Simpson).

9/ See Brief of Respondents, Quivira Mining Company v. NRC, No. 85-2853 (10th Cir. July 10, 1987). Relevant portions of the staff's brief are attached as Exhibit 2.

10/ The City of West Chicago has asserted that the West Chicago site "is a new disposal site." City of West Chicago Comments at 21. It is difficult to ascertain the basis for this statement -- which is plainly incorrect on its face. While it is true that final stabilization under UMTRCA has not been completed at this site, the owners of the site during the nearly 40 years of site operations plainly thought of it as the final resting place for the tailings, not as a temporary storage facility. Under the City's theory, if West Chicago is not an "existing" site, it is difficult to think of a tailings site anywhere in the United States that would meet that description. Congress plainly did not intend the important distinction between new and existing sites to be erased in such a transparent manner.

The distinction in the application of the criteria between new and existing sites is conceptually sound, as the DSFES proves. It is apparent, because of the propinquity of populated areas and the availability of other alternatives, that West Chicago would not be an optimal location for the installation of a new mill tailings facility. Hence the criterion appropriately would demand the weighing of population factors in evaluating the siting of such a facility. But the safety calculus radically changes with an existing site. As the DSFES shows, the environmental and health risks associated with moving the wastes from West Chicago for stabilization elsewhere are in fact greater than those that would arise from stabilization in place. See Kerr-McGee Comments at 2-6. The criteria thus must be applied with a common-sense awareness of the impact of the existing circumstances.

Second, the proposal for permanent disposal of the wastes in West Chicago site is not inconsistent with the requirements of Appendix A. The individual criteria cited by the City and others must be interpreted and applied in light of the "Introduction" to Appendix A, which emphasizes that:

"[a]ll site specific licensing decisions based on the criteria in this Appendix or alternatives proposed by licensees or applicants will take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the Commission determines to be appropriate."



This provision, which precludes automatic application of the individual criteria to a particular site without regard to site-specific conditions, was added to Appendix A in response to a provision of the Uranium Mill Tailings Radiation Control Act ("UMTRCA") that specifically requires the Commission to ensure that the costs associated with the regulation of tailings sites bear a reasonable relationship to the benefits derived. 42 U.S.C. § 2114(a)(1); see American Mining Congress v. Thomas, 772 F.2d 640 (10th Cir. 1985), cert. denied, 106 S. Ct. 2275 (1986). Thus, the specific objectives listed in the Appendix A criteria may be applied to specific sites only to the extent that the benefits obtained from such application outweigh the costs imposed.<sup>11/</sup>

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<sup>11/</sup> The Illinois Department of Nuclear Safety ("IDNS") argues that the DSFES must select a site based upon "optimization" of the factors listed in Criterion 1. The IDNS criticizes the DSFES for failing to conduct such an optimization analysis and for considering factors (including engineering and transportation considerations and political, social, and economic factors), not listed in Criterion 1. IDNS Comments at 9. The IDNS's rigid view of Appendix A is plainly inconsistent with the congressional mandate to balance costs and benefits. Moreover, the IDNS's criticism of the DSFES for consideration of factors not listed in Criterion 1 has no basis in either UMTRCA or NEPA; indeed, to the extent that such factors are relevant to the siting decision in the broader sense, it would be inappropriate under NEPA for the Commission to fail to consider them. (Ironically, the IDNS also criticizes the DSFES for failing to give adequate consideration to such factors. See IDNS Comments at 14.)

Another provision of UMTRCA, 42 U.S.C. § 2114(c), permits licensees to propose alternatives to the specific requirements adopted by the Commission where those alternatives "achieve a level of stabilization and containment . . . and a level of protection for public health, safety, and the environment . . . which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by" the NRC's regulations. The Introduction to Appendix A provides that the Commission will permit licensees to employ alternatives that meet this statutory standard.

Taking into account the Introduction to Appendix A, it is plain that the West Chicago site satisfies the applicable regulatory requirements. The DSFES demonstrates in considerable detail that the environmental as well as economic costs of moving the wastes to a site that might meet the criteria more closely far outweigh the benefits of such a course. Moreover, to the extent that Kerr-McGee's disposal plan constitutes an "alternative" to the requirements of Appendix A, it has been fully demonstrated that the plan "will achieve a level of stabilization and containment" and "a level of protection for public health, safety, and the environment"

which is more than "equivalent to" the protections that would be accorded by strict application of the criteria.<sup>12/</sup>

Finally, the legal status of the Appendix A criteria is not entirely clear. Appendix A is currently undergoing judicial review in the United States Court of Appeals for the Tenth Circuit, and among the issues under consideration of the court are the extent to which the criteria should be amended to provide even greater flexibility and consciousness of cost-effectiveness than that provided by the Introduction to Appendix A. Quivira Mining Co. v. NRC, No. 85-2853. In applying Appendix A to this site, the Commission must keep in mind the very real possibility that the court will remand the criteria for revision on these points.

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<sup>12/</sup> In considering the applicability of the "prime option" of below grade disposal established under Criterion 3, one must also consider the specific recognition in Criterion 3 itself that "[i]n some instances, below grade disposal may not be the most environmentally sound approach." In fact the criterion recognizes that below grade disposal should not be required where, as in West Chicago, the water table is close to the surface. The criterion states that, in such cases, the Commission's response will not be automatic rejection of the site, but rather a requirement that a disposal plan be developed to ensure "reasonably equivalent isolation of the tailings from natural erosional forces." This requirement has been fully met in this case.

B. Groundwater Contamination at the West Chicago Site

Many comments, particularly those of the Illinois Attorney General's Office, focus at great length on the allegedly high level of groundwater contamination in the site area and the alleged role of the site facility in causing that contamination.<sup>13/</sup> In considering those comments, one must keep in mind the fact that the fundamental purpose of the DSFES is not to assign blame for past wrongs, but rather to assess a proposal for disposing of the West Chicago wastes. Seen in this light, many of the comments offered by various parties concerning groundwater contamination are all but irrelevant, since even those parties do not claim that Kerr-McGee is seeking approval for continuation of the practices that are alleged to have created the contamination in the first place.

It must be remembered that the very purpose of the disposal methods used by Kerr-McGee's predecessors at the site was to inject waste materials from the site into the groundwater. This was state-of-the-art disposal technology at the time. As a result, as much as a half a million gallons of wastewater was pumped every day to disposal ponds, from which the water seeped into the ground.

Even during the height of site operations, the effects of these groundwater disposal practices were,

<sup>13/</sup> See also Comments of IDNS and John W. Cooper, Ph.D.

fortunately, relatively minimal.<sup>14/</sup> No public supply wells in West Chicago were ever affected by site operations. Instead, in part because of the very favorably hydrogeologic conditions at this particular site,<sup>15/</sup> most of the contaminated water was heavily diluted and harmlessly flushed away.

Even though site operations have ceased, some lingering effects of these past disposal practices can still be seen in the shallowest groundwater immediately under the site. Statistical studies of water quality data from wells located on the site indicate that these effects are steadily decreasing, as the groundwater system continues to cleanse itself naturally. Because no new contaminants are being introduced into the system, it can be expected that this process will continue, even if nothing is changed at the site. Indeed, the shallowest aquifer used for drinking water purposes in the site area, the Silurian dolomite aquifer, is essentially of drinking water quality, even directly under the site.<sup>16/</sup>

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<sup>14/</sup> Indeed, as is discussed further below, the area of impact from site operations on local groundwater has been substantially overestimated in the past. See infra at 55-59.

<sup>15/</sup> Id.

<sup>16/</sup> See infra at 39-40, 64-65.



Based on some of the comments offered on the DSFES, one would think that Kerr-McGee has proposed to resume operations at the site and to begin again to pump large volumes of contaminated water into the aquifer. In fact, the Kerr-McGee proposal will do just the opposite -- Kerr-McGee seeks authorization to remove contaminated soil from the ground, to neutralize the wastes to reduce their mobility, and to cover everything with an impermeable cover. At that point, nearly all of the water moving under the site will be free of the residual effects of site operations, and groundwater should have essentially the same chemical composition downgradient of the site as it has upgradient. In short, the Kerr-McGee disposal plan will accelerate the natural cleansing process already ongoing at the site.

The question addressed by the DSFES is a simple one: Will the disposal plan proposed by Kerr-McGee provide adequate protection to groundwater? Because the very worst-case scenario that can be imagined is a failure of the cell that would cause a return to something approaching current conditions,<sup>17/</sup> it is plain that the Kerr-McGee plan cannot

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<sup>17/</sup> In fact, a total return to current conditions will be practically impossible, since the wastes will have been neutralized to reduce their mobility, and since the cell, even if significantly damaged, will continue to provide substantial protection against infiltration and resulting contamination. See infra at 80-81, 90-91.

significantly harm public health or the environment for the simple reason that the site does not impose such harms today. In any event, however, the DSFES conclusively demonstrates that the protections to be afforded to groundwater by the Kerr-McGee disposal cell will not only be adequate -- the proposed plan will provide better protection than any other alternative considered. For purposes of the licensing decision for which the DSFES was developed, nothing else really matters.

C. Disposal at a Low-Level Waste Site

Several commenters have suggested that the DSFES should have included consideration of disposal of the Kerr-McGee wastes at a low-level radioactive waste disposal site. See, e.g., City of West Chicago Comments at 12; Illinois EPA Comments at 2; U.S. EPA Comments at 7. This alternative is not available as either a legal or a practical matter.

Although uranium and thorium mill tailings have low levels of radioactivity, they are not "low level" wastes in the legal sense. Instead, they are "11e.(2) byproduct material," and Congress has created a special regulatory scheme for their disposal under UMTRCA. That statute requires uranium and thorium tailings to be disposed of under a special scheme established and controlled by the federal government to regulate, not just the disposal of such materials, but also

aspects of the operation of the mills in which they are created. Tailings are created in very large volumes at relatively few sites and are almost always disposed of at or near the mills where they are created.

An entirely different scheme is established for the regulation of low-level waste under the Low-Level Radioactive Waste Policy Act, which directs that the disposal of low-level waste is to be primarily the responsibility of the states. Most types of low-level waste are created in relatively small volumes; it is therefore necessary to consolidate the low-level waste produced by numerous sources in one location in order to avoid the creation of thousands of separate disposal locations. By far the greatest regulatory problem confronted by Congress and the states has been the creation of sufficient disposal capacity for these wastes at properly established and managed sites.

There are currently only three sites in the United States available for the disposal of low-level radioactive waste. The states have been extremely slow in fulfilling their responsibility to establish additional sites. As a result, room in the existing sites is running out, and there are currently strict limits on the shipment of additional material to those sites. Certainly none of them is prepared to accept the shipment of millions of cubic feet of tailings and associated wastes from West Chicago.



Nor is the proposed new site to be established in Illinois under the Central Midwest Regional Compact a viable alternative, as some commenters have suggested. First, there is no such site. Illinois is legally obligated under the Central Midwest Compact to be the host for that compact's first site. But the Illinois state legislature has mandated that no political subdivision of the State may be required to accept the site against its will. Although a few municipalities in Clark County may be interested in the site (8 Nuclear Waste News 61 (Feb. 25, 1988)), we understand that every single county that has been seriously considered for this purpose, including Clark County, has affirmatively voted against accepting the site.<sup>18/</sup> The political problems confronted by the State in establishing the site would, if anything, be compounded by a proposal to expand the low-level waste site to provide room for the West Chicago byproduct material.

Moreover, at this point, the responsible state agencies are only now investigating potential sites. The NRC's obligation under NEPA is to consider specific alternatives to the proposed site, not general or generic alternative sites. Florida Power & Light Co. (St. Lucie Nuclear Power Project, Unit No. 2), LBP-77-27, 5 NRC 1038,

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<sup>18/</sup> Exhibit 3 includes press reports concerning the State's efforts to find an appropriate low-level waste site.

aff'd, ALAB-435, 6 NRC 541 (1977). Where, as here, there is not even any realistic indication that a specific site will be identified in the foreseeable future, then consideration of that alternative is not appropriate, much less required, under NEPA.

Finally, there is no basis to believe that the future low-level waste site that must eventually be built in Illinois would accept the material from West Chicago even if it were legally permitted to do so. The long struggle that has already taken place over the location of that site underscores the need to preserve its capacity for the low-level waste that must be accommodated there. This conclusion is confirmed by a recent draft of the compact's Regional Management Plan, which states:

"The inactive Kerr-McGee facility in West Chicago, Illinois, could ship around 10 million ft<sup>3</sup> of contaminated material some day (NRC83, CH86), but this material does not fit the definition of LLW and will not have to be accommodated in the regional disposal facility."

Central Midwest Interstate Low-level Radioactive Waste Compact, Regional Management Plan 2-10 (undated draft) (emphasis added). A copy of the relevant portion of the draft plan is attached as Exhibit 4.

### III. RESPONSES TO SPECIFIC COMMENTS

We turn now to the most significant comments that have been submitted on the DSFES by various agencies and

individuals. We set out excerpts from the comments, followed by Kerr-McGee responses.

A. City of West Chicago

Comment:

In sum, the historical background of the proposals . . . has been fraught with gross under-estimates of cost and volume and pure speculation on the part of the licensee and the government agencies . . . . It is inconceivable that K-M can submit a plan for disposal in May of 1983 that would cost \$16,000,000, increase by two-fold the amount of waste and the size of the disposal site and maintain a similar cost in non-comparable dollars. (page 4-5)<sup>19/</sup>

Response:

The City's criticism of the changing estimates of the volume of waste misses the mark because the City fails to appreciate the reasons for the changes. Extensive activities have taken place since the issuance in 1983 of the Final Environmental Statement Related to the Decommissioning of the Rare Earths Facility, West Chicago, Illinois (NUREG-0904) (hereinafter "FES"). These efforts have allowed refinement of the volume estimates. Kerr-McGee has completed an exhaustive sampling program that has made possible a reasonably accurate determination of the volume of materials that the cell must accommodate. Moreover, the volumes of some categories of waste, such as the material to be included in the cell from the Sewage Treatment Plant, are now known with greater

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<sup>19/</sup> See also AG Comments at 53-54; IDNS Comments at A-7.

precision because those materials have been excavated and are now stored on the site. Such volumes could only be crudely estimated in 1983. Thus, the fact that the volume estimate has changed is not surprising; it merely reflects the accumulation of extensive data since 1983.

The NRC is in a better position than Kerr-McGee to reconcile its 1983 estimate of costs with the estimate in the DSFES. There are several points that it is important to note in this connection, however. First, it must be observed that the DSFES includes a detailed and careful tabulation of the various elements that make up the current cost estimate. Although the City has had the opportunity to point to elements of the estimate that are unreasonable or unjustified, it has failed to identify any aspect of the staff's analysis of the cost of onsite disposal that is erroneous or unfair.

Second, for present purposes the cost estimate for any given alternative is probably less significant than the comparative costs of the alternatives. The staff has prepared its cost estimates for all the alternatives using a standard procedure. If the cost of onsite stabilization is under- or over-estimated, it is likely that the costs for the alternatives are similarly under- or over-estimated.<sup>20/</sup> The

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<sup>20/</sup> In at least one respect, however, the staff's analysis serves to significantly underestimate the costs of the alternatives to onsite disposal. As the staff is aware,

comparative costs are thus useful and revealing. There can be no reasonable challenge to the fact that the costs of offsite disposal are significantly greater than those of onsite disposal. Moreover, as the DSFES shows, offsite disposal would impose greater risks and environmental harms than those associated with onsite disposal. See Kerr-McGee Comments, 2-6 (Oct. 1, 1987).

Comment:

Subpart C defines four characteristics which, if exhibited in waste, cause it to be classified as hazardous: ignitability, corrositivity, reactivity, and extraction procedure (EP) toxicity. the final characteristic is defined in terms of unacceptable concentration of contaminants in the extract developed by applying the EPA prescribed test (Appendix II of 40 CFR 261) to the waste. It appears to the reader that the other three characteristics were ignored in the evaluation. In addition, a waste may be hazardous if it contains a "listed" material in 40 CFR 261, Subpart D. (page 25)

Response:

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(Footnote Continued)

Kerr-McGee has undertaken a detailed program to characterize the hydrological and geological circumstances at the West Chicago site. No characterization work has taken place at any of the alternative sites, but such work would have to be completed before that site could be used for disposal. Because the staff's estimates of costs do not include funds for site characterization, the estimates for the alternatives are too low. Kerr-McGee believes that such site-characterization work would likely cost on the order of \$1.5 million. In addition, offsite stabilization may require the construction of haul roads and other facilities -- costs that need not be incurred for onsite stabilization. See infra at 78.



All of the various criteria relevant to the determination of whether the West Chicago materials constitute "hazardous waste" were considered, either on the basis of the innate characteristics of the wastes (they are, for example, clearly not "ignitable" as EPA defines that term) or through tests performed on numerous samples of the wastes. The results of these tests, which are reported in Volume VIII of the Kerr-McGee Engineering Report, demonstrate conclusively that the wastes display none of the "characteristics" defined in Subpart C, nor are any of the "priority pollutants" listed in Subpart D found in the wastes. See Kerr-McGee Comments at 11-15.

Comment:

[10 C.F.R. Part 61 requires] protection of general population from releases of radioactivity. Concentrations of radioactive material which may be released to the general environment must not produce annual doses exceeding an equivalent of 25 millirem to the whole body, 75 millirem to the thyroid and 25 millirem to any other organ of any member of the public. The proposed action is in violation of this section. (page 26)

Response:

Part 61 does not apply to the West Chicago site. However, the requirements of 40 C.F.R. Part 192 do apply, and these regulations provide dose limitations like those discussed in the comment. As shown in Exhibit 1 and discussed infra at 105-106, the stabilization of the tailings at the West Chicago site will not result in a violation of the annual dose limits.

Comment:

Table 5.14 suggests that there is a radiation dosage of 1,300 person-rem attributable to the transportation of the materials during the action period . . . .

The assumptions contained in this Table are, to put it bluntly, ridiculous. . . . It is assumed that the maximally exposed individual will maintain a constant three meters behind the truck as it leaves the City of West Chicago and travels to one of the alternative disposal sites. The assumption that a person will constantly maintain a three meter distance from a transportation vehicle is clearly wrong. . . .

The second erroneous assumption is that an individual was located 30 meters from the transportation route. . . . [I]s the drafter assuming that there would be a line of people who would stand at approximately 30 meters from the route or have homes 30 meters from the route on a constant basis . . . [?] (pages 32-34)

Response:

While the methodology used in the DSFES for calculating the radiation dose is not detailed specifically, the text indicates that models developed to estimate the radiological impacts of transporting uranium mill tailings were used for the analysis. DSFES at 5-45. The use of models is the only reasonable basis for assessing the questions addressed, and the assumptions used in the modelling are reasonable.

The assumptions underlying the dose calculation represent conditions under which a hypothetical individual would receive maximum exposure. While the possibility is remote that any individual would confront these circumstances, this fact alone does not negate the validity of the assumptions or the doses calculated. The same approach was

used in calculating the dose for the hypothetical maximally exposed individual adjacent to the facility site.

The City disparages the alleged assumption that a person would travel along at a constant distance from the waste truck or would stand continuously adjacent to the transportation route. Although the City is correct that it is doubtful that a single individual would be exposed in this fashion, the point of the calculation is to determine the integrated exposure of those persons who are maximally exposed at any point in time. In other words, it is appropriate to assume that exposure positions around the shipment vehicle are continuously occupied, albeit perhaps not always by the same person.

The City also criticizes some of the factors used in the calculations. But these factors are completely standard. See Taylor, J. and Daniel, S., RADTRAN III: Revised Computer Code to Analyze Transportation of Radioactive Material (Sandia 1982) (3 meter separation between vehicles on 2-lane highway or city street; 30 meters in range of values for distance from roadway). And, in any event, the dose calculations for radioactive particulates -- the major source of exposure during transportation -- are much less sensitive to distance than are estimates of doses from direct radiation.

Comment:

Two newer studies found that due to the extremely low probability of transport accidents, the annual risk to workers and the public from radioactive releases from low level radioactive waste transport



accidents is far lower than that from routine low level active waste transport. Thus, the NRC has concluded that the potential impact of waste transport accidents should be ignored in the evaluation of transport risk. The reference in the DSFES to accidents (Chapter 6) and the table 5.15 are in error and should be totally ignored. (page 35)

Response:

A full and proper assessment of risks should include consideration of the risks of transport accidents. Indeed, the assessment should include not only the radiological risks arising from an accident, but also the direct health risks from an accident. See Kerr-McGee Comments, 3-4 and Tables 2-3. Moreover, the reference in the DSFES to accidents (Chapter 6) is not erroneous; the reference is proper and provides the basis for the overall accident rate per kilometer traveled that was used by NRC. In fact, as shown in the Kerr-McGee Comments, the actual experience in Illinois would suggest a larger accident rate. Kerr-McGee Comments, Table 3, n.l.

Comment:

Appendix page B-6 states that the disposal site may be expanded onto the intermediate site if the disposal site is inadequate to hold the quantities of matters [sic] that are to be disposed. . . . If the disposal site must be expanded because the volume of material is greater than estimated, the DSFES is outdated and inaccurate. (page 36)

Response:

The expansion of the cell would not appreciably change cell performance, nor significantly alter its impacts. See infra at 82-83. The assessment set out in the DSFES thus

encompasses the impacts that would arise if the cell were expanded onto the intermediate site to encapsulate a greater than expected volume of material.

Comment:

It is noted in the DSFES that the City of West Chicago may be required to accept, at its wastewater disposal facility, sewage and/or storm water run-off from the site that may be contaminated. The City of West Chicago will not accept such material in either its wastewater facility or storm water run-off infrastructure. (page 38)

Response:

Kerr-McGee will not release water to either the storm or sanitary sewer that does not meet applicable release criteria.

Comment:

[The highest and best use for this site is light industry or commercial use under the City's I-1 zoning classification. . . . Based on a comparison with the development immediately to the south, the City will have a loss of twelve million dollars . . . of private investment if the proposed action of onsite disposal is approved. . . . The community will forego 250 direct job opportunities for its residents and the result economic benefit from service related industrial and job growth, sales and real estate taxes. (pages 41-42)

Response:

The City's analysis is premised on the assumption that the entirety of the 29 acres south of the factory site would be developed for industrial purposes if onsite disposal were denied. But the City has provided no justification that any such development would in fact occur. The City's

pie-in-the-sky estimates of the gains from development would apply with equal force to show that the residential areas immediately adjacent to the site should be converted to industrial use. Kerr-McGee is aware of no plan -- or, indeed, even a proposal -- to modify the land uses in the area.

In fact, as shown on the City's zoning map,<sup>21/</sup> the very acreage that the City assumes would be used for industrial development has been designated as an "E-R estate district." The acceptable uses for such property do not include industrial development of any type.<sup>22/</sup> Thus, the industrial usage presumed by the City in its comments is in fact completely inconsistent with the City's determination in other contexts of the appropriate use of the West Chicago property.

Comment:

As is typical of the drafters' blatant avoidance of issues not favorable to the proposed action, the issue of property values is treated with little or no regard. . . . NRC staff has ignored the fact that there has been a tremendous increase in county-wide population and property values, in general, while West Chicago property values have not kept pace.  
(page 44)

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<sup>21/</sup> The relevant portions of the City's zoning map and its zoning ordinance are set out as Exhibit 5.

<sup>22/</sup> The permitted uses include, among others, "[p]arks, playgrounds and forest preserves," and "[p]ublic open land, refuge and preserve." The Kerr-McGee disposal cell will serve exactly such land uses, whereas the City's assumed industrial development is directly contrary to its own zoning requirements.

Response:

Although the City asserts in its comments that the West Chicago site has an adverse effect on property values, the City provides no evidence to substantiate its assertions. In fact, the Mayor of West Chicago observed in his recent "State of the City" speech that land values are higher inside the City than outside its borders. See Exhibit 7. The available data would suggest that West Chicago property values are not depressed in comparison with those elsewhere in the area. See Kerr-McGee Comments, 21-23 & Ex. 3.

Comment:

Table [8.5] . . . contains an error on its face. . . . [T]he figures in the total net benefit column for alternatives A through D should be 25,000 instead of 23,000. . . . The discussion of the radiological benefits states that "[t]he long term net benefit for the Proposed Action would be slightly less than that for alternative A - D; however, the differences are within 2% of one another and are insignificant." The figures are 23 for the proposed action and 25 for the alternatives. That is a 8% - 9% difference between the figures, not 2%. (page 49)

Response:

Table 8.5 is correct. The column listing the "Total Net Benefit" reflects the impacts of both the action period and the long-term period, rounded to two digits. The City would evidently ask the NRC to ignore the adverse action-period impacts of offsite disposal.

The Cite has also misconstrued the text. It is apparent that the staff intended to state that the "total net benefit" of the various alternatives is within roughly two

percent of each other. Table 8.5 demonstrates that this statement is true.<sup>23/</sup>

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The City's comments included a list of questions submitted by citizens at a public meeting. We respond to those questions raising significant issues:

Comment:

1. I live one block away. In response to the statement by NRC that Kerr-McGee is monitoring the air while the building is being torn down; all types of dust blows through the air, what guarantee do we have that this air is safe?

Response:

Kerr-McGee maintains, and will continue to maintain, a comprehensive air monitoring program to assess the surrounding environment during periods of decommissioning activity. The program includes area monitoring, downwind monitoring, and personnel monitoring of employees carrying out the work. Evaluation of the data generated from the various monitoring stations provides an appropriate base for assessing both onsite and offsite airborne concentrations from which

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<sup>23/</sup> The table sets out the data rounded to two significant figures; the total net benefit for all alternatives is approximately 23,000 person-rem. The data enables the determination of the unrounded estimates; the total net benefit for the Proposed Action is 22,730 person-rem, and for Alternative A, for example, is 23,300 person-rem. The difference in the total net benefit is approximately two percent.



exposures to the general public can be modeled. The extensive data obtained demonstrate clearly that activities on the site do not pose a serious threat of exposure of the public. Further, dust suppression methods have been, and will continue to be, employed during site decommissioning activities.

Comment:

11. Assuming cost is not a factor, per Congressman Hastert's Amendment, where would disposal be safest?

23. Is the decision to leave the material in West Chicago based totally on the anticipated cost of moving it?

Response:

The endorsement of onsite disposal in the DSFES is based on a complete evaluation of all relevant factors, including health, safety, and environmental impacts, as well as economic costs. If economic costs are disregarded, the analysis in the DSFES demonstrates that onsite disposal is still the safest and most environmentally sound of all the alternatives considered.

Comment:

13. If you bury it here, what's going to stop others from sending their "unwanted" waste to us?

21. If there isn't material being brought in, then what about from excavating people's yards?

76. If West Chicago is an "approved site" what's to stop the NRC from approving additional shipments of low level waste to our community for "safe burial"?

91. If West Chicago is chosen as the site for permanent burial of the thorium, will we have to accept waste material from outside West Chicago in the future?

Response:

Kerr-McGee's disposal plan anticipates that the wastes removed from the neighborhoods in the vicinity of the site, the Sewage Treatment Plant and Reed-Keppler Park will be included in the cell for disposal along with the onsite wastes. With these limited exceptions, however, the disposal cell is proposed as a means for stabilization of only the existing onsite wastes. There is no proposal to use the site as a general repository for low-level wastes from other locations; indeed, such a use of the site would be unlawful under the governing statutes. Moreover, once work on the disposal cell is completed, it will be impracticable to reopen the cell to add other wastes.

Comment:

18. Is this scale model fairly accurate? If the mound is somewhat impervious it is displacing a great deal of water which, according to the model, has a small retention pond on the far south-west corner. There is no intermediate ditch between the mound and the houses to the east. According to the model all those homes would receive the drainage.

Response:

Before construction of the disposal cell, a perimeter drainage swale will be constructed to intercept and direct area stormwater runoff around the cell to the detention/sedimentation pond located at the southwest corner of the disposal site. The swale will prevent stormwater runoff from the cell area from flowing onto adjoining



property. The swale will remain in place following disposal activities.

The detention/sedimentation pond to which runoff is directed will meet all applicable legal requirements and will control surface runoff from the completed disposal cell area. The detention pond will be large enough to contain runoff from the disposal cell area for a 100-year, 24-hour storm event, assuming a 95% runoff factor. See Kerr-McGee Engineering Report, Volume IX, Section 9.5.6.2.

Comment:

22. Given your evaluation of costs have you factored in the costs of the possible failure of the containment vessel here as compared to elsewhere?

Response:

As discussed in greater detail in the response to other comments,<sup>24/</sup> all of the various sites were evaluated based on a relatively conservative (i.e., pessimistic) view of likely environmental impacts. Further analyses have been performed by Kerr-McGee to evaluate the probable impacts of a severe failure of the disposal cell at the West Chicago site. Those analyses demonstrate that there would be no significant impacts on health, safety, or the environment even if the cell were substantially damaged or otherwise failed to perform as

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<sup>24/</sup> See infra at 74-75, 80-81.

designed. It is not clear from the DSFES whether similar analyses were performed for the other alternatives.

Comment:

53. How much did Kerr-McGee pay Argonne Laboratories for their studies that said the waste was safe?

Response:

Argonne National Laboratories is an independent research facility that performed its review of the Kerr-McGee disposal plan and the various alternatives under a contract with the NRC. Argonne has been paid for this study by the NRC, not Kerr-McGee. Kerr-McGee, like other interested parties, including various state agencies, provided information to Argonne as requested from time to time. Kerr-McGee has had no other connection with, or influence over, the results of Argonne's study.

Comment:

62. Is Kress Creek contaminated?

Response:

Various analyses of water from Kress Creek have revealed that the Creek is affected by a number of sources, most of them upstream of the Kerr-McGee site. There is little or no evidence of significant impacts on the creek from the site. Simultaneous analyses of samples collected upstream and

downstream of the site have shown virtually identical water quality in both locations.<sup>25/</sup>

Comment:

63. Is the water safe to drink?

68. The aquifer of concern in this area is a relatively shallow fractured dolomite only 70 ft. deep[. I]s ground water in the bed rock protected? Shale is a much better barrier to contaminant migration than [sic] sandy clay and dolomite. I believe West Chicago and Warrenville use the dolomite aquifer.

80. How safe is our drinking water at the present time?

Response:

There has never been any impact from the West Chicago site on public drinking water supplies, and none are to be anticipated in the future. Even the most vocal opponents of Kerr-McGee's disposal plan have acknowledged that the site has had no effect whatsoever on public supply wells in the West Chicago area. To the extent that the site has had any effect on groundwater, that effect has been limited to a small (and diminishing) area in the immediate vicinity of the site. Indeed, the Silurian dolomite aquifer (the shallowest aquifer used in West Chicago for drinking water purposes) is nearly of drinking water quality even directly under the site. Natural groundwater flow patterns in the area of the site are

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<sup>25/</sup> See infra at 119.

such that future migration of contaminants in the direction of public wells is extremely unlikely.

As for future effects on groundwater, it must be recognized that current conditions represent the very worst situation that could possibly exist at the site in the future. Thus, if the disposal cell planned for the site were to fail completely, the impact on groundwater would be no worse than it is today -- and would probably be substantially less, since the wastes will have been neutralized to make them less likely to migrate.

As for questions about the hydrogeology of the site in general and contaminant migration in the area of the site, see the response to the State Attorney General's comments on this issue below.

Comment:

66. What is the permeability of the proposed clay cap to radon gas? Has this been addressed?

Response:

Both Kerr-McGee and the staff have calculated the radon flux that would be released by the cell. The analyses show that the flux released from the wastes through the cell cap is comparable to that from normal soils in the area (less than  $0.5 \text{ pCi/m}^2\text{s}$ ) and more than forty times less than the applicable limits established by the NRC and EPA ( $20 \text{ pCi/m}^2\text{s}$ ). Kerr-McGee Engineering Report, Volume XII, 12-4 (revised July 23, 1986); DSFES at 5-53.

Comment:

71. How does rain runoff from Kerr-McGee affect the West DuPage River now after the two 100 year rains?<sup>26/</sup>

Response:

On August 14, 1987, a 24-hour rainfall amount of 6.01 inches was measured at the Wheaton weather station near West Chicago. The 100-year, 24-hour storm for West Chicago is about 5.9 inches, according to information presented in "Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois," published by the Northeastern Illinois Soil Erosion and Sedimentation Control Steering Committee in October 1981. Thus, the August 14 rainfall was slightly larger than a 100-year event.

Kerr-McGee has stabilized the West Chicago facility to prevent erosion of tailings or contaminated soils. Thus, the runoff from the site today is not significantly different from the runoff from the surrounding urban areas. After the closure proposed by Kerr-McGee, the site will be even more secure against erosion. All wastes will be covered with more than eight feet of uncontaminated soil. The soil cover will be constructed to resist erosion and to isolate the waste materials from the environment.

In the design of the cell, Kerr-McGee used projections of 24-hour rainfalls as large as 8.2 inches to assess

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<sup>26/</sup> See also IDNS Comments at 18-19.

potential infiltration and erosion of the cell. Thus, although the August 14 rainfall was a large and rare event, Kerr-McGee has designed the cell to withstand much larger storms.

Comment:

94. How much longer is the eyesore rubble of Kerr-McGee going to remain where it is at?

Response:

Kerr-McGee has sought to clean up and close the site for more than ten years. Its current proposal for onsite stabilization has been pending before the NRC since 1981. Kerr-McGee cannot legally perform any work on the site without amendments to its NRC license. Limited license amendments have been granted over the last few years for the dismantling of buildings and the like, but further work cannot begin until approval of the pending application for a license amendment permitting final stabilization of the site. Kerr-McGee would like nothing better than to proceed to complete this work and to improve the aesthetic impression created by the site. If stabilization is not approved, the aesthetic impacts of present site conditions are likely to persist indefinitely.

Comment:

101. Do the piles at Kerr-McGee have anything to do with radiation in Geneva water? West Chicago water?



Response:

No. Many areas of the United States have elevated levels of radioactive elements that occur naturally in their groundwater supplies. This part of Illinois is one of those areas. Radioactivity levels are in fact higher in the deeper groundwater aquifers that have no possible impacts from the site. Radioactivity levels in samples drawn from groundwaters potentially affected by the site have shown relatively low radioactivity levels.

Comment:

109. Reports found at the West Chicago Public Library state that contamination was found at 27 ft. below the surface into the E stratum and continuing into the D stratum, also 28 ft. below the surface which is at ground elevation below, and extended throughout sludge piles and tailings piles, so how can you honestly say that there has been no contamination seeping further into the ground or into the water table?

Response:

Many years ago, during operations at the plant, ponds were constructed, with the knowledge and approval of the State of Illinois, to provide a mechanism for encouraging seepage of waste fluids into the soil. Many of those contaminants remain in the soil today. When they are in contact with water, soluble portions may dissolve and move within the groundwater system. It is for this reason that some residual contamination is still seen in the shallow glacial groundwater today. It has been shown, on the basis of extensive studies of the site, that contaminants currently found in the subsurface are primarily materials that were placed there during the operation of the plant, and that leaching from

wastes on the surface of the site has little or no impact.

See generally Kerr-McGee Engineering Report, Vol. II. As a result, the groundwater system is gradually cleansing itself, and groundwater quality under the site is steadily improving.

Comment:

117. What happens if animals do burrow into the waste? Or what happens if tree roots do penetrate into the waste?<sup>27/</sup>

Response:

It is possible that animals will seek to burrow into the uppermost layers of the cover, and that some trees will establish themselves on the cell. However, a cobble layer will be placed below the uppermost soil layers of the cover to prevent further intrusion by either plants or animals. The wastes themselves will be buried, not only below the soil and cobble layers, but under an additional clay cap designed to prevent infiltration of rainwater.

A Kerr-McGee consultant, Dr. George Ware of the Morton Arboretum, has evaluated the succession of plant life on the disposal cell. Kerr-McGee Engineering Report, Volume VI, App. B. In performing this evaluation, Dr. Ware examined plant succession in the West Chicago area and considered the effects of the design of the cell cover upon plant life and root penetration. Dr. Ware concluded that there is virtually

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<sup>27/</sup> See also AG Comments at 36.

no likelihood that plant roots will penetrate the cobble layer and reach the clay cap or the buried wastes.

The thick cell cover, in conjunction with the cobble layer, will also prevent cap damage by burrowing animals at the West Chicago site. Studies conducted at the Los Alamos National Laboratory have shown that the presence of a cobble layer is a significant deterrent to cap disruption by burrowing animals.

Comment:

125. In the NRC's proposal for onsite burial of thorium wastes, there is mention of onsite wells. Some are to be plugged and some left open for waste treatment. What ground water impact studies have been done in relation to these wells and local ground water? What about leeching [sic]?

Response:

Several types of wells exist or have existed in the past at the facility. In the 1950's, the facility obtained water from wells constructed on the southern part of the Factory Site. A deep injection well was constructed, but never used, on the Disposal site. All of these wells have been plugged in accordance with the requirements of the State of Illinois.

In recent years, Kerr-McGee has constructed a large number of monitoring wells in both the glacial and dolomite aquifers on and around the facility. The State Attorney General's office has also constructed monitoring wells on the site. The closure plan will require that many of these wells be plugged because they are located where the disposal cell is

to be constructed. The methods used to close the wells will prevent the migration of potential contamination along the well bores.

Some existing monitoring wells may be retained as part of the post-closure site monitoring system and will be sampled periodically. The condition of the wells in the post-closure monitoring program will be assessed during sampling, and damaged wells will be repaired.

No other wells will remain on the site after closure. No wells have been used at the facility for any kind of treatment in the past, and no such wells are planned in the future.

Comment:

138. In light of the enormous flood damage that occurred in DuPage County this month can [it] be assured that retention ponds built at the Kerr-McGee plant site would be better engineered than all the other retention ponds in the country?

Response:

Two types of detention ponds will be constructed at the West Chicago facility. The first type of pond, which will be internal to the disposal cell, will act, in conjunction with the surrounding cell, to retain the water from even very large storms that occur during the course of cell construction. All storm water that potentially could be contaminated will be contained within the pond until the water can be treated, as necessary.

In addition, an ordinary storm-water detention pond will be constructed at the site to control the flow of uncontaminated water from the site. This pond, which will not contain or intercept any radioactive materials, has been designed to specifications which exceed the DuPage County regulations governing storm-water detention ponds. The pond is designed to function as a detention pond, with controlled releases, during storms equal to or less than a 100-year storm. In addition, the pond will have a one-foot freeboard above the maximum water level during a 100-year storm. An emergency spillway is provided that has the capacity to transmit the flow from a Probable Maximum Flood (Assumption B) without damage to the pond. The Probable Maximum Flood (Assumption B) is approximately equal to the maximum historic rainfall in the area.

The likelihood that a rain will occur that is so large that the pond will be overtopped is remote. No such storm has occurred in the site area since rainfall records have been kept.

Comment:

139. Accepting the uncertainty of nature, what would happen if the monitored retention ponds registered a dangerous level of leachate simultaneously to a sudden flood condition? Would nearby homes and businesses have to welcome these contaminated waters along with the flood?

Response:

The storm-water pond will be constructed above the groundwater table and so will not intercept leachate from the

disposal cell. The sole purpose of the storm-water retention pond is to regulate uncontaminated storm water flow from the closed site. Should unforeseen events cause that pond to overflow, no danger would be presented to nearby residents.

Comment:

146. Page 1.14 indicates a person 793 feet northeast of the West Chicago disposal site will receive an estimated dose of 40 m rems. 10 CFR 61 sets a maximum exposure at 25 m rems. What possible justification can you offer to ignore federal law other than for your convenience in supporting your decision?

Response:

As shown in Exhibit 1 and as discussed infra at 105-06, the applicable dose requirements would in fact be satisfied if onsite stabilization were allowed to proceed.<sup>28/</sup>

Comment:

152. How do you justify the major differences in Table 4.25 of the FES - Natural Background Radiation Doses and the information on page 4-107 of the Supplement. Has the background radiation dose increase that much?

Response:

There are no "major differences" in the background radiation dose data contained in Table 4.25 of the FES and the text on page 4-107 of the DSFES. Table 4.25 shows an annual

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<sup>28/</sup> The applicable requirements require that any dose calculation exclude radon and its daughters. 10 C.F.R. Appendix A, Criterion 8; 40 C.F.R. §§ 190.10, 192.32(a)(3)(i), 192.41(d). It is possible that the calculations in the DSFES include radon and its daughters.



whole-body dose for Chicago and the midwest of 98 millirem (mrem) per year comprised of cosmic radiation, external terrestrial radiation, and internally deposited radionuclides. The DSFES states that the annual total effective dose equivalent from all background sources is about 200 mrem per year, comprised of cosmic radiation, terrestrial radiation, weapons test fallout, other sources, internally deposited radionuclides, and radon and its short-lived daughters. In effect, the commenter is comparing different measures of dose, although perhaps the DSFES could have been clearer in its presentation of the information.

Comment:

159. You project minimal chemical impact on the groundwater in the 1000 year period. Is this projection averaged, one-time or cumulative? You can computer model anything, what is worse case scenario?

Response:

As noted above, the "worst case" for total failure of the cell is, at worst, no worse than current conditions, i.e., no impact on public water supply wells, and only limited and diminishing impacts on very shallow groundwater in the immediate vicinity of the site. A more sophisticated evaluation of the effects of cell failure based on computer modeling is provided in Volume II of the Kerr-McGee Engineering Report, which demonstrates that impacts beyond the edge of the property would be minimal even in the uppermost portion of the glacial aquifer.

Comment:

167. Page 5-69. Under what pre-emptive right do you allow violation of the law by adding more cyanide to the groundwater than is legally permitted?

Response:

The DSFES reports on page 5-69 that predictions of cyanide concentrations in groundwater beneath the site were only 13 percent (i.e., about one eighth) of the Illinois State water quality standards for general use and public water supplies. No action has been proposed for the site that would result in any legal limit on the concentration of cyanide in the groundwater beneath the site even being approached, much less exceeded.

B. Illinois State Attorney General's Office

Introduction:

The comments submitted by the Illinois Attorney General's Office ("AG") on groundwater impacts are for the most part mere repetitions of the arguments previously urged by the AG in this and other proceedings. The AG's arguments are based primarily on a highly selective recitation of evidence offered at a trial that took place in Illinois State court during the spring and summer of 1986.<sup>29/</sup> When all

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<sup>29/</sup> Illinois v. Kerr-McGee Chemical Corporation, No. 80 CH 298 (Cir. Ct. Ill.). This case involved a request by the state for an injunction precluding onsite disposal in West Chicago. In addition to asserting that onsite disposal is appropriate, Kerr-McGee has argued that the state court's

of the evidence offered at that trial is considered, together with the additional information provided in the DSFES, it is apparent that the AG's assertions are without merit.

Comment:

The glacial materials underlying the West Chicago site are extremely complex and have not been adequately characterized. (p. 3)

This complexity and the lack of adequate characterization renders the West Chicago site unable to provide adequate "hydrologic and other natural conditions as they contribute to continued immobilization and isolation of contaminants from groundwater sources" (Criterion 1), because we just don't know where the groundwater will flow to, and how long it will take to get there. (p. 11)<sup>30/</sup>

Response:

In support of its assertion that the geology of the West Chicago site is "highly complex" and has not been adequately characterized, the AG relies upon a cross-section of the site prepared by the AG's geological expert, Mr. Minning, that differs in some respects from cross-sections prepared by Kerr-McGee's experts, Drs. Fetter and Grant. Yet Mr. Minning based his drawing on only a small portion of the available data. Mr. Minning admitted at trial that one possible reason for the differences in interpretation between his

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(Footnote Continued)

jurisdiction over the matter is preempted by the NRC's jurisdiction established under the Atomic Energy Act. The state court has not yet ruled in the case.

<sup>30/</sup> See also Illinois EPA Comments at 2.

cross-section and Dr. Fetter's was the fact that he, unlike Dr. Fetter, reviewed only logs from the wells depicted on the cross-section and did not consider data from other, nearby wells that might have permitted him to consider the site geology in three dimensions. Aug. 28 Tr. at 45-47 (Minning). He further admitted that it was possible that Dr. Fetter's drawing, which was based on a more complete review of data from the site, could be correct. Id. at 45. In short, Mr. Minning's testimony demonstrated, not the lack of sufficient data, but his own failure to consider the data that had been made available.

Moreover, even if one accepts Mr. Minning's cross-section as a reasonable interpretation of the data (which is doubtful, considering his relative unfamiliarity with the large quantity of data available about the site), his interpretation of the site geology is not materially inconsistent with those presented in the FES, the DSFES, and Volume II of the Kerr-McGee Engineering Report.

The fundamental problem with the AG's criticisms is that the AG insists on rejecting the good in favor of an unidentified (and probably unidentifiable) perfection. Site characterization is not an abstract exercise, and the only relevant question is whether sufficient data have been gathered so that the potential impacts of a disposal cell located on the site can be predicted with adequate assurance

of accuracy. This standard has been more than met here.<sup>31/</sup> Indeed, as Dr. Frank Parker, the Chairman of the National Academy of Sciences' Board on Radioactive Waste Disposal, has testified:

"I believe that [the West Chicago site] has been adequately characterized. I would say that the characterization exceeds that . . . which one finds usually for facilities of this type.

"One certainly knows though that when one is examining natural materials, that there will be some variation. It's not a production line, and therefore, each unit will [not] be exactly the same.

"And so if one examines very closely the logs that were taken, one would see that there would be differences in the methodology, but one is not concerned with microdifferences of that sort. One is concerned with how a whole facility will operate, what will be the average and maximum transport.

"One is not so concerned about minute differences. One is concerned only by the macrodifferences, and I believe in that sense, the site has been very well characterized."

Aug. 20 Tr. 50-51. (Dr. Parker's Testimony was attached as Exhibit 2 to Kerr-McGee's Comments.)

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<sup>31/</sup> Kerr-McGee drilled numerous monitoring wells on and in the immediate vicinity of the site. Each well was carefully logged by qualified geologists. In 1986, the AG itself drilled additional wells on the site, which (although not as carefully drilled or logged) provided additional information about the site. In addition to the geologic information made available through the logs, Kerr-McGee gathered a vast quantity of additional information through (1) analysis of samples taken from the borings during drilling, (2) numerous water level and other hydrologic tests of the wells, and (3) systematic water quality analyses of samples from the wells performed on a quarterly basis from the date of drilling up to the present.

A site characterization is generally sufficient if it provides the answers to three key questions:

- (1) Where is groundwater found beneath the site?
- (2) In what general direction is groundwater moving beneath the site?
- (3) What principal geologic features affect groundwater flow beneath the site?

All hydrologists and other experts who have ever analyzed this site (including the AG's own experts) agree that: (1) groundwater is found in two principal sand and gravel layers (the "E" and "C" strata) and in the underlying dolomite rock; (2) groundwater entering the glacial aquifer at the site flows to the south and southwest under the site and for the most part discharges into Kress Creek; and (3) there are two thick clay and till layers under the site (the "B" and "D" strata) that retard downward flow of groundwater.

This fact was confirmed in the testimony of the AG's expert, Mr. Minning:

Q. Let's turn now to the matter of flow directions. That's the case, isn't it, that in order for water from the surface to reach the silurian dolomite, the water from the surface must first pass through the glacial aquifer?

A. Yes.

Q. You agree in the E stratum there is a substantial component of horizontal flow?

A. Yes.

Q. And in fact, in the sand and gravel layers, the horizontal component of water velocity is much greater than the component of, the vertical components of velocity?



A. Yes.

Q. And the existence of the head difference between the E stratum and the dolomite shows, does it not, that the clay layers are effective in retarding downward movement?

A. Yes.

Q. You also agree, don't you, that horizontal flow in the E stratum carries water from the vicinity of the N wells to the southwest?

A. Yes.

Q. And the site itself is to this, generally to the southwest of the N wells?

A. Yes.

Aug. 28 Tr. at 47-48.

Comment:

Pollutants which are discharged to the ground surface or subsurface at the West Chicago site will pollute this regionally important aquifer. As stated in the DSFES, "the Silurian dolomite aquifer is hydraulically connected with overlying glacial sands and gravels and is recharged almost entirely by those units" (page 4-37). This hydraulic connection is demonstrated most clearly by the isopleths of groundwater contaminant concentration which, significantly, were included in the FES . . . . Those isopleths are bull's-eyes, with the site right in the middle. (page 6)<sup>32/</sup>

Response:

This analysis by the AG relies upon and expands a misinterpretation of the hydrogeology of the West Chicago area that has muddled the understanding of the site for years. The

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<sup>32/</sup> See also IDNS Comments at 6; Illinois EPA Comments at 2; Comments of John Cooper at 2(c).

most important determinants of contaminant transfer below the water table are the speed and, in particular, the direction of groundwater flow. If attention is paid to these characteristics of the groundwater in West Chicago, the flaws in the AG's analysis are immediately apparent. The glacial and dolomite aquifers in the general area of the site are indeed hydraulically connected. But what the AG fails to recognize is that the connection immediately under the site is minimal.

As discussed above, all experts who have reviewed the site agree that by far the majority of the groundwater in the glacial aquifer flows horizontally to the south and southwest toward discharge points in creeks and streams.<sup>33/</sup> Only a very small proportion of the water flows downward to the dolomite aquifer. The principal source of recharge to the dolomite aquifer at any particular point is therefore an area upgradient of that point in the glacial aquifer, not the

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<sup>33/</sup> This strongly horizontal flow is caused by two factors: (1) the general tendency of groundwater to flow "downhill" toward discharge points, and (2) the thick clay layers underlying the water-bearing sands and gravels. The clay layers are relatively impermeable to water and thus accentuate the horizontal component of flow. The AG has from time to time asserted that holes may exist in the clay layers that have been "missed" in Kerr-McGee's site evaluation. Although there is no evidence that such "holes" in fact exist, an assumption that they do exist (and if they do, they must be very small) does not significantly affect the overall flow pattern.

portion of the glacial aquifer that directly overlies that point.

Thus, for example, the principal recharge area for the portion of the dolomite aquifer directly underlying the site is the glacial aquifer in an area to the north and northeast of the site. Wells drilled in that area (the "N" wells) contain groundwater whose quality is very similar to that of the dolomite groundwater under the site. As for the portion of the glacial aquifer directly under the site, water from that area would ordinarily continue to flow to the south and southwest, with a portion eventually reaching the dolomite aquifer. However, the local discharge point for the glacial aquifer, Kress Creek, is located immediately to the south of the site. Thus, almost all of the glacial groundwater that has been affected by the site is discharged to the Creek long before it could reach the dolomite aquifer.<sup>34/</sup>

As for the "bull's-eyes of contamination" cited by the AG, the isopleth drawings to which the AG refers are inconsistent with the hydrogeology of the glacial and dolomite aquifers and in particular with flow patterns in those two aquifers. The greatest flaw in these "bull's-eyes" is their

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<sup>34/</sup> Contrary to the AG's assertion, Dr. Grant's testimony was not inconsistent with this analysis. Dr. Grant testified only that some water from the glacial aquifer generally seeps to the dolomite aquifer, not that it does so to any significant extent from the site itself. See July 17 Tr. at 63 (Grant).

very "bull's-eye" shape, i.e. a series of concentric circles around the site instead of a true plume beginning at or near the northern edge of the site and flowing southward along with the groundwater flow in the glacial aquifer.<sup>35/</sup> The AG's "bull's-eyes" simply defy the laws of nature. If there are areas well to the north of the site that have high levels of contamination, the perceived correlation with contamination on the site cannot be more than coincidence (except, of course, to the extent that they demonstrate the existence of another source to the north that is both contaminating the northern wells and contributing to the contamination in the onsite wells).<sup>36/</sup>

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<sup>35/</sup> The direction of flow in the dolomite aquifer is generally to the north. However, as discussed above, the dolomite aquifer is recharged from gradual seepage from the glacial aquifer, which flows predominantly to the south and southwest. Thus, a contaminant that enters from the surface at a particular point may eventually be seen in the dolomite aquifer in an area north of that point, but only after it has first flowed southward in the glacial aquifer, gradually downward through the various layers of glacial material, and then northward again, experiencing substantial dilution at every stage. Thus, even the northward flow of the dolomite aquifer does not permit anything approaching the even distribution of a contaminant around the source suggested by the AG's "bull's-eyes."

<sup>36/</sup> The invalidity of the AG's "bull's-eye" analysis is also demonstrated by the fact that water in the dolomite aquifer directly under the site is relatively clean. If contamination were flowing downward from the site surface and then outward in a circle, the "center" of the "bull's-eye" would be more contaminated than the outer areas, not less so.

Consider, for example, a hypothetical example in which contaminant X is found in the Mississippi River in the amount of 10 mg/l in St. Louis, 20 mg/l in Memphis, Tennessee, and 40 mg/l in New Orleans. Considering that data alone, the AG's logic would "prove" that the contamination in New Orleans "caused" the contamination in St. Louis. The fact is, however, that because the river flows south from St. Louis to New Orleans, the causal connection is physically impossible. The contamination in St. Louis might contribute to the contamination in New Orleans, but the converse cannot be true. So too in West Chicago. The contamination in the dolomite aquifer that is "upstream" of the site cannot properly be attributed to the site. Yet this is exactly the argument that the AG has made.

Comment:

[Certain quotations in the DSFES] were drawn from the "overview" section of Kerr-McGee's Geohydrological Review [Volume II of the Kerr-McGee Engineering Report], not from the main body of that document. That overview, like the overview sections of all of Kerr-McGee's technical submissions to NRC, was written by Covington & Burling, Kerr-McGee's lawyers. None of the overviews were written by Kerr-McGee's technical consultants. In many instances in which the overviews contain overstatements -- such as these examples -- the technical consultants have affirmatively disowned the overview. (page 6)

Response:

This statement presents at best an extremely twisted history of the overviews to the Kerr-McGee Engineering Report. The overviews were drafted by Kerr-McGee's attorneys in order

to provide summaries that would be easily understood by nontechnical readers. They were prepared, however, with substantial assistance and input from the hydrogeologists and other consultants who prepared the main body of the report. None of Kerr-McGee's experts has ever disowned any of the overviews, and Kerr-McGee is fully prepared to present evidence that its experts consider the overviews to be accurate.

The experts who testified at the trial concerning the Kerr-McGee Engineering Report were denied any opportunity to affirm or deny the contents of the overviews, since the AG's representative objected to any testimony concerning them. The alleged example presented by the AG of one of those experts "disowning" the overview to Volume II is in fact nothing more than the AG's faulty conclusion that the expert's testimony was inconsistent with statements in the overviews. As discussed above, those alleged inconsistencies are in fact nothing of the sort.<sup>37/</sup>

Comment:

[T]he State has installed a well several miles to the northeast of the site. . . . Data from this well . . . show that actual background concentrations of chemicals are [substantially lower than concentrations found under the site]. (page 9)

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<sup>37/</sup> The example cited by the AG, Dr. Grant's testimony about the direction of flow in the glacial aquifer, is discussed supra at 57 n.34.



Response:

Groundwater quality data from a single distant well is essentially useless in assessing background water quality in the West Chicago area. The Illinois State Water Survey has issued a publication demonstrating a wide variation in groundwater quality in DuPage County. Sasman, et al., Verification of the Potential Yield and Chemical Quality of the Shallow Dolomite Aquifer in DuPage County, Illinois, Circular 149 (ISWS 1981) ("Circular 149"). Although some aspects of Circular 149 have been criticized on methodological grounds, the study does demonstrate the generally accepted fact that groundwater quality varies tremendously from one point to another in the county.<sup>38/</sup> Since many areas of DuPage County, including West Chicago, are highly urbanized (with an inevitably higher level of pollution stemming from general industrial activities, sewage, and road salting), while others are less so, data from a well located several miles from the site give little or no useful information concerning the significance of the site as a source of pollution.

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<sup>38/</sup> At trial, the AG relied upon Circular 149 in an attempt to demonstrate actual "background" water quality in West Chicago. It was shown, however, that the report could not reliably be used for that purpose, since the limited number of data points and the authors' general methodological approach precluded accuracy at a sufficient level of detail. The report was only intended to show (and could only show) average groundwater quality across relatively large areas of the county.

Circular 149 included a series of charts of water quality data from the dolomite aquifer. These charts presented cumulative frequencies of the occurrence of concentrations of dissolved species in water samples from wells located all over DuPage County. When compared to these county-wide plots, the West Chicago data from the dolomite aquifer was found to be near the county-wide median concentrations for almost all species (other than TOX, for which, as described below,<sup>39/</sup> the site data have been found to be invalid because of analytical problems). Thus, water quality in the dolomite aquifer beneath the disposal site is typical for DuPage County -- a fact that suggests the absence of any significant impacts from the site.

Of even more significance are the data from the N wells, which are located northeast of the site (but much closer than the AG's well) in an area that is (1) upgradient beyond any possible zone of influence from the site in the glacial aquifer and (2) in the area that is most likely to serve as a recharge point for the portion of the dolomite aquifer located directly under the site. As discussed above, data from those wells show that the site has had little or no impact on the dolomite aquifer. Thus, if the dolomite aquifer in the area of the site contains higher levels of some

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<sup>39/</sup> See infra at 121.

chemicals than is found in other areas of the county, such levels are the result of sources other than the Kerr-McGee site.

Comment:

Section 302.203 of the Board's Water Pollution Standards requires that certain underground waters meet both the General and Public and Food Processing Standards. . . . The glacial drift and dolomite aquifers at West Chicago must meet these standards. (page 18)

Response:

This interpretation of the Illinois regulations is inconsistent with the language of the regulations. Section 302.203 states that both sets of standards are applicable only to "the underground waters of Illinois which are a present or a potential source of water for public or food processing supply." The public and food processing supply standards are further limited in their applicability; they need only "be met . . . at any point at which water is withdrawn for treatment and distribution as a potable supply or for food processing." Id. at 302.302 (emphasis added).

In accordance with those limitations, neither set of standards has been "violated." It is undisputed that (1) the glacial aquifer is not used as a source for public water supplies either directly beneath the site or in the general

area of the site;<sup>40/</sup> (2) the dolomite aquifer directly beneath the site is not used as a source for public water supplies;<sup>41/</sup> and (3) nearby public supply wells drilled to the dolomite aquifer have never shown any effects from the site, even when the facility was fully in operation.<sup>42/</sup> In these circumstances, sections 302.203 and 302.302 make clear that neither of the sets of standards relied upon by the AG has any application to water drawn from monitoring wells on the site.

Accordingly, any comparison of groundwater quality data from wells on or around the site with Pollution Control Board standards is irrelevant. Moreover, data from wells drilled outside the site's zone of influence confirm that, quite apart from the site's alleged effects, groundwater in West Chicago already contains concentrations of some

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<sup>40/</sup> There is no evidence that anyone has proposed the glacial aquifer for future use, and there are strong reasons -- unrelated to the alleged effects of the facility -- to believe that no one will do so in the future. July 22 Tr. 59 (Fetter). The fact that some water from the glacial aquifer recharges to the dolomite aquifer is irrelevant, absent a showing (which has not been made) that public supplies in the dolomite aquifer have been affected.

<sup>41/</sup> Since NRC regulations require perpetual government stewardship of the site, it is hardly likely that anyone will ever drill a public supply well on the site. In any event, water in the dolomite aquifer directly under the site easily meets the general use standards and most public and food processing water supply standards and is generally safe to drink. July 23 Tr. 57-58 (Fetter).

<sup>42/</sup> July 23 Tr. 60 (Fetter); April 17 Tr. 1665-66 (Gibb).

constituents in excess of the standards.<sup>43/</sup> The fact that groundwater under the site has similar concentrations is thus hardly surprising and certainly cannot be attributed to the facility.

The ultimate fact is that the site does not now have a significant adverse impact on groundwater, and that it does not now have, never has had, and never will have (even under the no-action alternative) any adverse effect on public health or safety in West Chicago as a result of groundwater contamination. As Dr. Fetter has testified:

Q. Do you have an opinion to a reasonable degree of scientific certainty as to whether there are significant health concerns posed by the groundwater quality in the dolomite aquifer under the site?

A. Yes, I do.

Q. And what is that opinion?

A. That there [are] no significant health concerns.

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Q. Do you have an opinion to a reasonable degree of scientific certainty as to whether the West Chicago site will ever have any impact on public water supply?

A. Yes.

Q. And what is that opinion?

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<sup>43/</sup> For example, the average concentration of total dissolved solids in the offsite wells is 753 mg/l, well above the public and food processing supply standard for that parameter. Similarly, one offsite well had a fluoride concentration of 3 mg/l, which is more than twice the general use standard of 1.4 mg/l.

A. That it will not.

\* \* \* \* \*

Q. Do you have an opinion to a reasonable degree of scientific certainty as to whether the conditions of the West Chicago site ever would require the City to turn to alternative water supply?

A. Yes, I do.

Q. And what is that opinion?

A. That the West Chicago site would not present any situation where the City would have to turn to an alternative water supply.

July 23, Tr. 57-58, 60-61 (Fetter). Dr. Fetter's testimony is set out as Exhibit 4 to the Kerr-McGee Comments.)

Comment:

The Staff clearly implies . . . that dilution is the solution to pollution. (page 17)

Response:

This statement by the AG, perhaps more than any other, displays the AG's fundamental misunderstanding of the Kerr-McGee disposal strategy. The goal of Kerr-McGee's disposal plan is not simply to keep leachate from escaping from the disposal cell, but to keep it from forming in the first place. Leachate is the result of water infiltrating from the surface and interacting with the wastes. If water is prevented from seeping downward from the surface, then no leachate can form. It is for this reason that the most important element of the disposal plan is the impermeable cell cover, which will prevent rainwater from reaching the wastes in the cell.



However, as any chemistry student knows, nothing is completely impervious to water over very long periods of time, and there is no such thing as a truly impermeable material. Thus, no matter how the disposal cell is built, if it is built in a part of the world where it rains regularly, some water will eventually penetrate the cell cover and reach the wastes, forming leachate. It is at this point that Kerr-McGee's analyses of dispersion and dilution, which the AG treats with such disdain, become relevant.

There are three alternative approaches that can be taken to dealing with leachate that forms in a disposal cell: (1) one can pump and treat it, (2) one can permit it to remain in the disposal cell, or (3) one can seek to regulate its release to the environment so as to ensure that it will cause no damage. The first alternative is not a practical one for extremely long-term disposal and is expressly disfavored by UMTRCA and the NRC's Appendix A criteria. The second alternative is highly dangerous, since if the leachate cannot escape from the cell and is not removed it will build up until it finally escapes in springs and pools along the top and sides of the cell in a "bathtub effect," causing potentially severe environmental damage. This "bathtub effect" has in fact been

seen at some older disposal sites in which leachate was allowed to build up within relatively impermeable cells.<sup>44/</sup>

The third alternative is thus the one employed in the Kerr-McGee disposal plan. By ensuring that the liner of the cell is more permeable than the cover, the leachate that is created can escape from the cell before it builds to dangerous quantities. Since the cell cover will allow only tiny amounts of leachate to be created at any one time, the release of that leachate to the environment will have minimal effect. This effect will be diminished even further by the dispersion and dilution effects of water flowing through the sand and gravel layers under the site. Careful modelling of the site and of likely flow patterns of leachate demonstrates that the effect on groundwater beyond the edge of the site will be insignificant. See Kerr-McGee Engineering Report, Vol. II, Section 2.5.2.4. Indeed, this will be true even if the cover effectively fails in preventing infiltration and the creation of leachate. Id.

Ironically, the Illinois State Geological Survey has long stressed the importance of recognizing the impossibility of designing a completely "escape-proof" disposal cell, particularly in a humid climate such as exists in Illinois. Cartwright, et al., Hydrogeologic Considerations in Hazardous-

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<sup>44/</sup> See Aug. 20 Tr. 30 (Parker).

Waste Disposal in Illinois, Environmental Geology Notes 94

(ISGS 1981). The ISGS's report observes that

"Present [state] disposal regulations assume that long-term total isolation of hazardous wastes from the environment is possible through disposal of these wastes in 'secure chemical waste landfills' that have liners of very low hydraulic conductivity. In reality, very long periods of isolation cannot be achieved because some leachate from the wastes buried in the ground will migrate to some extent.

Id. at 4. The report stresses that "'zero discharge' measured at the boundary of the disposal area would not be realistic," and warns of the need to avoid a "bathtub effect." Id. at 4, 7. The report also points out that the "bathtub effect" can be caused, not just by insufficiently permeable liners, but also by siting decisions that place the disposal cell in natural materials of extremely low permeability.

Members of the ISGS staff have also participated in studies of the effectiveness of cell covers such as the one proposed by Kerr-McGee in preventing infiltration and the creation of leachate. Significantly, although Tom Johnson, one of the state's geology experts who testified at the trial, was both a co-author of the Cartwright report and a participant in the cell cover studies, the AG did not ask him to testify on those subjects at trial.

Comment:

A proper waste disposal site should be configured so that there is a natural backup to the engineered design of the disposal cell, i.e. a thick layer of low-permeability material should underlie the cell

to provide a natural means to limit the migration of contaminants away from the site. (page 15)<sup>45/</sup>

Response:

Kerr-McGee agrees that a proper waste disposal site must provide a natural backup to the engineered design of the disposal cell. However, Kerr-McGee does not agree that a site characterized by a thick layer of low-permeability material provides the appropriate natural protections. As discussed above, such a site is particularly vulnerable to the "bathtub" effect. A site, such as the West Chicago site, that permits leachate to be dispersed and diluted gradually in small quantities is far superior to a site that forces leachate to build up in a small area until the pressures of its accumulation cause it to escape in a large, uncontrolled release.

Comment:

Above-grade disposal exposes the cell cap to a variety of natural forces which will eventually destroy it. (page 21)<sup>46/</sup>

Response:

In support of this assertion and its other assertions about erosion, the AG relies principally upon selected excerpts from the testimony presented by Dr. Grant, one of Kerr-McGee's experts, concerning the effects of erosion on the integrity of the cell. Dr. Grant testified that the

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<sup>45/</sup> See also IDNS Comments at 7-8.

<sup>46/</sup> See also IDNS Comments at 8.

cell was designed to provide numerous protections against harmful erosion, and that the erosion that may be expected to occur will not significantly affect the integrity of the cell or its value in protecting health, safety, and the environment. Upon cross-examination, the AG elicited testimony from Dr. Grant (the only portion of his testimony even mentioned by the AG in its comments on this subject) to the effect that it is theoretically possible for certain types of erosion to occur at the site. It does not follow, however, that such erosion would significantly affect the performance of the cell.

For example, the AG makes much of the possibility that the uppermost soil layers could be disturbed by falling trees and burrowing animals. Yet the impacts of such disturbances would be limited by the cobble layer, which is less prone to such intrusion. The AG's only attack on the value of the cobble layer for this purpose is beside the point: the AG notes only that the type of stone to be used in the cobble layer has not yet been specified. Yet there is no serious dispute that an appropriate rock can be and will be obtained when the cell is built.

Kerr-McGee performed elaborate sensitivity analyses to produce estimates of erosion at the site based on various assumptions about site conditions. The best estimate of erosion, which assumed conditions actually expected at the site, was 0.2 inches on the top of the cell and five inches on

the cell sides over a 1000-year period. Kerr-McGee Engineering Report, Volume IV, at 6-1. More pessimistic estimates were 0.3 inches on the top and eight inches on the sides. Id. No erosion calculations performed using realistic assumptions indicated that the cell would be adversely affected by erosion.

The AG asserts that "common sense" shows that the estimates reached by Kerr-McGee are wrong. The AG points out that everyone is familiar with washes and gullies, implying that most erosion is of that kind. However, the AG has not demonstrated that this kind of erosion is in fact found in grass-covered areas in West Chicago.<sup>47/</sup> In fact, no such areas existed in the area of the site. Roadway cuts and fills in the West Chicago area are typically constructed on slopes of 50 percent or more.<sup>48/</sup> Yet no exceptional erosion on these slopes occurs once a vegetative cover is established. An empirical examination of actual conditions in the West Chicago

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<sup>47/</sup> The AG suggests that the Staff has ignored the potential for gully erosion because there is no way to calculate the extent and severity of such erosion. In fact, numerous studies have demonstrated that gullying does not occur in situations where, as here, sheet and rill erosion is negligible.

<sup>48/</sup> The AG criticizes the slopes of the proposed cell by comparing them to a roadway and pointing out that few roads have 20 percent slopes. The relevance of this point is unclear. Roads usually do not have 20 percent slopes because of the energy required to climb them, not because such slopes are inherently inappropriate for all purposes.



area shows that the AG's "common sense" is, at best, misleading.

Finally, the AG's analysis of the erosion of rocks confuses the effects of the size of mineral crystals with the effects of the size of rocks formed from such crystals. The AG suggests that since large mineral crystals weather more slowly than small crystals, riprap-sized rocks weather rapidly. This is incorrect. (Indeed, if it were true, gravel would weather quickly, sand would be a transient phenomenon, and silt and clay-sized particles would presumably be identifiable only in the laboratory.) Moreover, it must be kept in mind that what is under discussion here is a layer of rock that the Staff estimated to have a lifetime of 40,000 years after all soil cover is removed.

The principal purpose of the AG's arguments about erosion is to suggest that a need for maintenance of the disposal cell might arise. The AG assumes that any possibility, no matter how remote, that even minor maintenance could be required at some point in the future is sufficient to render a disposal option unacceptable. Such an assumption, if rigorously applied to all proposals (and not solely to the Kerr-McGee proposal that the AG disfavors) would render impossible any long-term waste-management plan, since no design can be conclusively shown to be 100 percent maintenance-free under all imaginable conditions.

Apart from the issue of maintenance, the AG's comments on erosion are essentially irrelevant. It has been fully demonstrated that there will be minimal reductions in the cell's performance even if the cell is substantially damaged by erosion or other events. For example, the cell is designed to protect groundwater principally through (1) neutralization of the wastes, and (2) the existence of the clay cap, which is located under several feet of soil and the cobble layer. The first protection cannot be affected by erosion. The second can be affected to some degree, but only if the thick covering layers are first removed and the clay cap itself is penetrated.<sup>49/</sup> And even if that happens, groundwater modelling analyses show that the groundwater will still meet all applicable water quality standards at the edge of the site. Indeed, as discussed below, the groundwater model employed to produce the projections reported in the DSFES conservatively assumes a level of infiltration that could occur only if the cell cover were substantially damaged.

Moreover, even if there were appreciable erosion of the cell, the radon-flux standard would be satisfied. The

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<sup>49/</sup> It is practically impossible to imagine a situation in which a layer of the cover could be stripped away uniformly from the entire cell. It is certainly impossible for all of the layers covering the clay cap to be completely removed by natural means. At most, small areas of the cover could conceivably be eroded to various limited depths, but the rest of the cover would remain relatively intact.

nominal or expected flux from the cell is estimated to be 0.35 pCi/m<sup>2</sup>s -- far below the required limit of 20 pCi/m<sup>2</sup>s established in the UMTRCA standards. A detailed calculation shows that if the topmost 60 cm layer of the cell were removed, the flux from the cell would be only 0.48 pCi/m<sup>2</sup>s. And if the top two layers were assumed to be removed (the top 120 cm of the cell) -- a highly implausible assumption that even the clay-cobble layer would erode -- the flux would be only 1.78 pCi/m<sup>2</sup>s. In short, even if substantial destruction of the cell were assumed, the radon flux standard would still be readily satisfied.<sup>50/</sup>

Comment:

Why has the Staff assumed that the bins used for transportation of the LSA material could not be re-used? By assuming that it would be necessary to spend \$19,000,000 on bins for each of the alternatives (except the proposed action), the Staff has virtually assured that any alternative which involves transportation of the wastes offsite will be more expensive. (page 39)<sup>51/</sup>

Response:

Re-use of the transportation bins does not automatically guarantee the great reduction in costs that is suggested by the AG. Reusable bins must be more sturdy (and hence more expensive) than single-use bins. And in order to re-use the

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<sup>50/</sup> The computer output setting out the calculation of the radon flux is attached as Exhibit 6. See also Kerr-McGee Engineering Report, Volume XII (revised July 23, 1986).

<sup>51/</sup> See also IDNS Comments at A-8.

bins, an unloading and decontamination facility must be constructed to receive the material. To assure that contamination is minimized during emptying (e.g., from dusting), the unloading facility must consist of more than a simple, unsheltered dump ramp. At a minimum, the operation would require an enclosed building equipped with automated dumping equipment and a separate, sophisticated washing and scrubbing area for efficient decontamination of the bins for return shipment. If a washwater decontamination system is employed, a water-treatment facility will be required -- essentially, a small wastewater treatment plant to impound and treat water prior to release. In short, the savings anticipated in re-using bins most surely will be spent in the construction and maintenance of the bin-handling facilities and for appropriate personnel monitoring and safety equipment.

The potential for exposure to individuals, both to workers and the public, is increased with operation of the bin-reuse alternative. Although single-use bins could be placed directly in the disposal cell with minimal resulting exposure at the disposal site, reusable bins would entail the releases associated with emptying the bins and placement of the wastes. The dose commitments for the offsite alternatives are already substantially higher than the onsite alternative, and the need to handle the materials and to clean and monitor the bins prior to return would only increase personnel and public exposure.

Comment: -

In calculating the land acquisition costs for the alternatives, the cost of purchasing the alternative sites should be offset by the sale value of the West Chicago site. The land acquisition costs for the alternatives may be negative based upon the low purchase prices of the farms or coal mined land and the high apparent value of the West Chicago property. (page 40)

Response:

The comparison of the various alternatives should properly include only those elements that are necessarily entailed in effectuating each alternative. It is thus inappropriate to include any proceeds from the sale of the West Chicago property in evaluating the offsite alternatives because offsite disposal does not require the sale of the site. On the other hand, because it is necessary to purchase the offsite property to pursue offsite disposal, it is necessary to include this cost in the evaluation of the offsite alternatives.

A moment's reflection reveals the conceptual weakness of the AG's suggestion that the sale value of the West Chicago site should be a set off against the acquisition cost of the alternative property. If the sale value of the West Chicago site were somehow to be included in evaluating the alternatives, it would be necessary also to factor in the costs that were incurred by Kerr-McGee in acquiring the site. (If the acquisition costs were not included, then all the alternatives would effectively be subsidized by Kerr-McGee's prior purchase of the West Chicago property.) Indeed, if the



sale of the site were to yield a significant loss to Kerr-McGee on its investment in the property, including the effects of the purchase and sale of the West Chicago property in the evaluation of alternatives would theoretically serve to increase the cost of the alternatives beyond those reflected in the DSFES. The staff has wisely steered away from these conceptual problems by not including either the cost of the West Chicago site or the proceeds that might result from its sale.

In addition, the AG's comment ignores several critical considerations. The land acquisition cost for any of the alternatives represents but a tiny fraction of the overall costs associated with that alternative. Even if the pursuit of an alternative would allow the sale of the West Chicago site, any realistic estimate of the proceeds would hardly offset the excess costs associated with the alternative. Moreover, there are substantial costs associated with the "purchase of a new site" that are additional to the actual land costs, but that are not recognized in the DSFES. For example, the alternative site will require geological and hydrological characterization -- an expense that might exceed \$1.5 million. In addition, it may be necessary to construct access ways and ancillary support facilities, such as work buildings, sanitary sewers, water supply, and other necessary work-related facilities. None of these costs are required at



the West Chicago site and any sale proceeds would be insufficient to offset these costs.

Comment:

The Staff should evaluate the costs and benefits of the construction of a deep-trench disposal cell at the farmland site. Alternative, if deep-trench disposal is not feasible at this farmland site, another site should be found for evaluation of below-grade disposal. (page 41)

Response:

The staff effectively has evaluated the costs and benefits of the construction of a deep-trench disposal cell, although the evaluation was undertaken for an Active Surface Coal Mine (Alternative A), rather than at a farmland site. The staff has correctly determined that below-grade disposal, although perhaps feasible at the farmland site, is not appropriate in light of the depth of the water table. (The same considerations make below-grade disposal inappropriate in West Chicago.) Contrary to the implication in the comment, deep-trench disposal does not necessarily minimize the engineering considerations in the design and installation of the disposal cell. Deep-trench disposal requires detailed site characterization and waste-receptacle preparation, including extensive excavation, liner preparation, and cover installation.

Comment:

The combined effects of erosion, disruption by tree roots, excavation by burrowing animals, and the activities of man can all lead to reduction of the cap thickness and therefore to the reduction of the cap's ability to limit radon releases. In the

absence of long-term maintenance, the cell cap will be compromised and radioactive gases may be released to the environment in an uncontrolled manner. (page 47)

Response:

If the top 120cm of the cover were removed, which is implausible because it would entail removal of the clay-cobble layer, the flux from the cell would be only 1.78 pCi/m<sup>2</sup>s. See Exhibit 6. Thus, even if there were extensive erosion of the cover, the radon flux would still be comparable to natural background fluxes measured in Illinois.

Comment:

The calculations of long-term impacts to the groundwater of the various alternatives are also based upon the assumption that the cell caps will perform exactly as designed for 1000 years. In the absence of long-term maintenance, this is not a fair assumption, and results in an underestimation of the resulting groundwater pollution, particularly in the case of the proposed action. (page 48)

Response:

The AG's statement is simply untrue. In their analyses of the long-term groundwater impacts of the Kerr-McGee proposal, the staff assumed an infiltration rate of one inch. DSFES at E-9. The infiltration rate for the cover proposed by Kerr-McGee is 0.07 inches, if the cover is intact. Kerr-McGee Engineering Report, Volume II, at 2-74. Thus, the staff analysis assumes a significant deterioration of the cover.

The conservativeness of this assumption can be seen by comparing the staff's assumed infiltration with typical

infiltration in the site area, which is only a few inches. (Estimates range from four to eight inches.) Thus, in order to provide a conservative (pessimistic) analysis of long-term effects of the proposed cell on the groundwater, the staff assumed that the cell would be little more effective in limiting infiltration than the natural soils in the site area. This is tantamount to assuming complete failure of the cell cover. The staff groundwater analyses demonstrate that the proposed cell represents no threat to the groundwater even under the most pessimistic assumptions as to cover performance.

Comment:

[O]nly one of the B-series wells (well B-2) shows a noticeable decrease over time. (page 50)

Response:

Again, this assertion is simply inconsistent with the data. As is shown in Tables 2-21 and 2-22 to Volume II of the Kerr-McGee Engineering Report, all of the B wells (with the possible exception of well B-1) show statistically significant downward trends in concentrations of the major ions associated with the site. Many of the KM (dolomite) wells also show statistically significant decreasing trends. Of those wells on the site that do not show statistically significant downward trends, all but a few show statistically indeterminate trends, in most cases because levels in those wells are already at or near background.

Comment:

The shallow groundwater is not presently used simply because Kerr-McGee has polluted it so badly. (page 51)

Response:

The AG's allegations are entirely unjustified and unsupported. The available evidence shows that the glacial groundwater is not used in DuPage County principally because of technological and yield problems and because the glacial groundwater is not generally of good drinking water quality, wholly apart from the alleged effects of the site.<sup>52/</sup> Thus, even if the Kerr-McGee site were magically removed from the face of the earth, people in West Chicago would still not drink water from the glacial aquifer.

Comment:

Kerr-McGee's experts have stated that the Disposal cell may be expanded onto the intermediate site, due to uncertainties in the waste volumes. . . . The Staff should analyze the cost and environmental impacts of the proposed action based on this increased waste volume and cell size. The erosional impacts of longer slopes must also be addressed. (page 54)<sup>53/</sup>

Response:

The analyses of the environmental impacts of the proposed stabilization plan prepared by the Staff and by Kerr-McGee considered a range of parameters that are more than sufficient to encompass the minor increases in waste volume

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<sup>52/</sup> See supra at 64-65.

<sup>53/</sup> See also City of West Chicago Comments at 36.

and disposal cell size that might cause an extension of the disposal cell onto the intermediate site. The incremental cost of disposing of additional waste that may be found on the site during closure will be only a small fraction of the total stabilization cost and is well within the range of uncertainty of the costs presented in the DSFES.

If the disposal cell were extended into the intermediate site, the current design of the cell would be maintained. Thus, extending the cell to the north would not result in any additional accumulation of water on the cell, nor would it result in any increase in erosion from any part of the cell. Total erosion from the cell might increase because the cell would be larger and erosion would be occurring from a larger surface; however, the erosion per unit area would be unchanged from the rates presented in the DSFES and the Kerr-McGee Engineering Report.

C. Illinois Department of Nuclear Safety

Comment:

Tables E.4 and E.5 show that in a relatively short period of time (450 years and 900 years), Uranium-238 and Radium-226 would reach their maximum concentrations in hypothetical onsite cells and that their maximum concentrations would be reached in a well at the downgradient site boundary in the same time frame. (DSFES at E-12, E-13) These predictions for the Proposed Action are to be contrasted with the predictions for the alternative sites where significantly longer periods of time would be required for the radionuclides to reach maximum concentrations in the onsite wells. (page 6)



Response:

Implicit in this comment is the assumption that the time required to reach a maximum concentration at a particular location is of significant importance in determining site suitability. Tables E.4 and E.5 show that, while the calculated times required for various isotopes to reach their maximum concentrations at hypothetical onsite wells is shorter at the West Chicago site than at alternative sites, the maximum concentrations themselves at the West Chicago site are orders of magnitude less than at the alternative sites. Table E.6 shows that predicted maximum concentrations for non-radioactive species are also much less for the West Chicago site than for alternatives.

Comment:

In a recent case interpreting the Atomic Energy Act, the United States Court of Appeals ruled that economic costs may not be taken into account by the NRC in fulfilling its mandate to ensure adequate protection of the public health and safety. Union of Concerned Scientists v. U.S. Nuclear Regulatory Commission, \_\_\_ F.2d \_\_\_ (D.C. Cir. 1987). (page 9)

Response:

The D.C. Circuit's decision in Union of Concerned Scientists v. Nuclear Regulatory Commission, 824 F.2d 108 (D.C. Cir. 1987), has little relevance to the staff's analysis in the DSFES. In that case, the court was considering rules promulgated by the Commission to govern backfitting of nuclear reactors. The court found that the statutory provision upon which the regulations were based, section 182(a) of the Atomic Energy Act, 42 U.S.C. § 2232(a), "makes no reference to



economic costs," and focuses "solely on health and safety considerations." 824 F.2d at 114. The court noted that "when Congress desired agencies to consider economic costs, it knew how to say so;" thus, when Congress was silent on the subject, it presumably did not mean to require consideration of such costs. Id. at 115.

Congress does indeed know how to indicate when it desires the Commission to consider economic costs, and it has explicitly done so in directing how the Commission is to go about managing uranium and thorium tailings. Section 84(a)(1) of the Atomic Energy Act states:

"The Commission shall insure that the management of any byproduct material as defined in section 11e.(2) is carried out in such manner as . . . the Commission deems appropriate to protect the public health and safety and the environment from radiological and nonradiological hazards associated with the processing and with the possession and transfer of such material, taking into account the risk to the public health, safety, and the environment, with due consideration of the economic costs and such other factors as the Commission determines to be appropriate."

42 U.S.C. § 2114(a)(1). The United States Court of Appeals for the Tenth Circuit has confirmed that Congress intended the management of uranium and thorium tailings to be conducted in a manner that ensures that the costs of such management bear a reasonable relationship to the benefits derived. American Mining Congress v. Thomas, 772 F.2d 640 (10th Cir. 1985), cert. denied, 106 S.Ct. 2275 (1986). Thus, unlike the nuclear reactor backfitting rules at issue in Union of Concerned Scientists, Congress has required the Commission to give due

consideration to economic costs in its decisions concerning disposal of the West Chicago wastes.

Even if the Commission were to decide (improperly) to ignore economic cost considerations, the DSFES still demonstrates that permanent disposal in West Chicago is the best alternative, because it is superior to the other alternatives considered on the basis of health, safety, and environmental considerations. Table 8.1, which summarizes the staff's cost-benefit analysis of the various alternatives, shows that the proposed action is the best alternative in terms of surface water impacts, groundwater impacts, and radiological impacts, among others. See Kerr-McGee Comments, at 2-6.

In sum, therefore, the decision in Union of Concerned Scientists provides no basis for rejection of the proposed action, either as a legal matter or on the basis of the facts established in the DSFES.

Comment:

The DSFES is deficient in that it places improper weight on short-term benefits, especially the monetary benefit of not transporting the wastes to another site, and fails to place primary emphasis on long-term isolation of the wastes. (page 11)

Response:

This criticism of the DSFES by the IDNS is unwarranted. A fair reading of the DSFES would show that the staff has made a thorough examination of the long-term consequences of onsite (and offsite) disposal and has properly

concluded that onsite disposal is the preferred alternative. For example, the staff has estimated that the cumulative radiological impact of the cell over a thousand-year period is only 0.019 health effects. DSFES, Table 5.22. Any reasonable person would properly conclude that this impact is so trivial as not to warrant concern.

The IDNS comments may suggest that the staff should ignore costs arising during the action period on the theory that the staff is to ignore short-term costs. UMTRCA requires, however, that the costs of tailings stabilization are to be in "reasonable relationship" to the benefits. See 42 U.S.C. § 2021(b); American Mining Congress v. Thomas, 772 F.2d 640 (10th Cir. 1985), cert. denied, 106 S. Ct. 2275 (1986). Because the costs of stabilization by definition must be incurred during the action period, the theory that short-term costs should be ignored would require the neglect of one side of the balance. Such an approach is obviously contrary to UMTRCA.

Comment:

The slope for the West Chicago site is the upper limit of slopes generally allowable. While not prohibited, such a steep slope is highly undesirable because it has much greater erosion potential than a more shallow slope and requires greater ongoing maintenance. (page 14)

Response:

Although the berms along the sides of the cell will have a slope of 5h:1v, the cell cover will have a far more gradual slope. All the slopes, including the slopes of the

berms, comply fully with the requirements of UMTRCA.

(Criterion 4 indicates that slopes should not be steeper than 5h:1v.) Moreover, the berms will be covered with a vegetative cover that will resist erosion, as well as with a cobble layer that would armor the berms from destructive erosion. A detailed calculation shows that the erosion of the cell will be slight and will not affect cell performance. Kerr-McGee Engineering Report, Volume VI, Section 6.4.

Comment:

In the DSFES's evaluation of the clay and shale mines advocated by Kerr-McGee as potential disposal alternatives, proximity to urban areas and residences is stated as a reason for ruling out sites #3 (DSFES at A-37), #11 (DSFES at A-41), #13 (DSFES at A-42), #15 (DSFES at A-42), #17A (DSFES at A-43) and #20 (DSFES at A-44). If the standards that were applied to other potential sites in Illinois had been applied to West Chicago, the West Chicago site would have been categorically excluded. The DSFES is inadequate because it does not explain why the standards applied to movement of wastes into a county for disposal should not be applied to disposal of wastes already in the county. (pages 14-15)

Response:

As discussed above, it is essential to undertake the analysis of alternatives based on existing circumstances. See supra at 13. Although West Chicago may not be the optimal location for the siting of a new mill facility, the DSFES shows it is the best site for stabilizing the tailings already present.

Comment:

The Universal Soil Loss Equation (USLE) and the three-dimensional solute transport model are used in

the DSFES to predict several important environmental impacts. However, the applicability of the USLE and the three-dimensional solute transport model to the proposed cell in a setting such as West Chicago has not been validated. . . . At a minimum, the potential impacts of reasonably foreseeable occurrences which are not contemplated by the USLE and the model (e.g., gully erosion) must be addressed. (pages 16-17)

Response:

The USLE was developed to estimate soil erosion from agricultural land and structures such as the disposal cell. Application of the USLE here shows that the overall potential for erosion is minimal. The absence of significant erosion, as calculated by the USLE, is a widely-used indicator that gully erosion is also unlikely to occur.

The groundwater transport modeling (using the three-dimensional model) accounts for potential damage to the cover by erosion or other destructive agents by using infiltration rates that are similar to the infiltration rates of natural soils at the site. Thus, the groundwater transport modeling performed by the Staff essentially takes no credit for the presence of the disposal cell cover.<sup>54/</sup>

Comment:

The impacts of cell failure must be analyzed to allow a full understanding of the potential long-term impacts. (page 19)

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<sup>54/</sup> See supra at 80-81.

Response:

An analysis of the probable impacts of cell failure has been performed. See supra at 74-75, 80-81.

Comment:

A worst case analysis must be performed. (page 19)

Response:

The IDNS admits that a worst case analysis is required only where the agency has not "carefully studied the potential environmental impacts of a proposed action and . . . determined, with a reasonable degree of certainty, the probability and consequences of such impacts." San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1302 (D.C. Cir. 1984). The Commission's study of potential environmental impacts here has been unusually detailed and more than meets this standard.

In any event, the substantial equivalent of a "worst case" analysis is easily derived from the studies that have already been performed. For example, the studies of potential groundwater impacts already assume a level of infiltration very close to a "worst case" assumption of total failure of the cell cap in preventing such infiltration. See supra at 80-81. Moreover, it is essentially undisputed that, from the perspective of all potential impacts on health, safety, and the environment, the disposal plan will lead to a net improvement over current conditions, even if the disposal cell substantially fails. The substantial analysis of current site



conditions therefore provides a picture that is almost certainly worse than the "worst case" that could arise post-closure. Given the absence of significant impacts on health and safety stemming from current conditions at the site, this "worst case" analysis confirms the conclusions concerning onsite disposal contained in the DSFES.

Comment:

[T]he assumption that 0.1% of the unpackaged wastes would be dispersed [during truck transportation] is not consistent with the assumption made by the U.S. Department of Energy (DOE) in conjunction with the remedial action project at the former Vitro Chemical Company mill tailings site. (page 21)<sup>55/</sup>

Response:

The staff's assumption that radiation exposure and dose to the public will occur during transport of the materials is correct. The DSFES states the doses calculated would result primarily from releases of radioactive gases and particulates to the environment during transportation. A conventional truck cover, such as a tarpaulin, would not significantly retard the diffusion of radon gas; moreover, no real-world cover would preclude the release of all particulates. Consequently, the dose from gases and particulates during transport should be estimated, just as the staff has estimated the dose from gases and particulates from the site during construction activities.

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<sup>55/</sup> See also AG Comments at 37.

The DOE report cited by the commenter does not suggest that no releases occur during transport under cover; the report states that "[i]t is assumed there are no routine particulate releases in the transportation corridor because covered vehicles will be used."<sup>56/</sup> It is incorrect to conclude from this statement that no releases, especially no releases of gases, will occur. Thus, the suggested revision of the DSFES is unwarranted.

Comment:

No reason is given in the DSFES why rail transportation to the alternative sites is not considered even though its potential advantages are recognized. . . . The postulated use of truck transportation instead of rail transportation leads to a substantial exaggeration of the costs (both monetary and environmental) of the alternatives and makes the Proposed Action look artificially superior. (page 26)<sup>57/</sup>

Response:

As discussed in the Kerr-McGee Comments, Kerr-McGee would investigate rail transport if it were in fact to move the material to one of the alternative sites. But, contrary to the comments by the IDNS, it is by no means clear that rail transport is feasible or that it offers significant advantages over truck transport. As Kerr-McGee has noted, there are a

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<sup>56/</sup> II DoE, Remedial Actions at the Former Vitro Chemical Company Site, South Salt Lake, Salt Lake County, Utah, F-31 (1984) (DoE/EIS-0099-F).

<sup>57/</sup> See also AG Comments at 37.

large number of logistical and equipment issues that would have to be resolved in determining whether rail transport is possible and practical. See Kerr-McGee Comments at 24-26. In fact, given the controversial nature of the West Chicago wastes, it is hardly clear that any of the railroads that could be used for transport would in fact agree to participate.

In any event, the benefits presumed by the IDNS from rail transport may not in fact materialize. The costs could be appreciable, particularly in light of the complicated logistical requirements associated with rail shipment. Although rail transportation provides a slightly lesser accident rate per mile (roughly 10 percent), the radiological impacts of transport could in fact be increased over those calculated for trucks both because of the greater length of the rail route for some alternatives (Compare id., Table 7 with DSFES, App. F) and the details of the population density along the route. Indeed, if the rail alternative were pursued using reusable bins for transport, the additional handling of the wastes would appreciably increase the radiation dosage associated with each of the alternatives.<sup>58/</sup>

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<sup>58/</sup> Rail transport of the wastes in non-reusable containers would require handling of the wastes at the rail spurs in West Chicago and at the disposal site and again in placing the wastes in the disposal cell. Increased dosage to workers and to the general public would be associated with each handling of the wastes.

Comment:

There is . . . a mathematical error in the analysis [of radiological costs and benefits]. According to Table 8.5 the Proposed Action has a radiological long-term benefit of 23 person-rem/yr while Alternatives A-D each has a radiological long-term benefit of 25 person-rem/yr. A value of 23 is not, however, within 2% of a value of 25 as stated in Section 8.3.9. A value of 23 is within 8% of a value of 25. . . . Unless a difference of 8% is considered to be insignificant, the Proposed Action should be given a long-term radiological benefit rating of "Less Benefit." (page 27)<sup>59/</sup>

Response:

The IDNS has misconstrued the DSFES. See supra at 33-34 & n.23.

Comment:

The cost-benefit analysis of soil erosion is improper because the costs of soil erosion losses at the West Chicago site are considered as costs for the alternatives but the costs of soil erosion at alternate sites were not considered as costs for the West Chicago site. (page 28)

Response:

Each option must be examined in terms of the areas that are affected by that option. Onsite stabilization involves only the Kerr-McGee site and thus only that site should be evaluated. Offsite disposal involves both the Kerr-McGee property and the offsite property and the impacts should be evaluated on both sites. Cf. supra pp. 77-79.

Comment:

It is stated in the DSFES that "the Proposed Action can only be denied if an alternative site(s) is identified that is obviously superior to the West Chicago site." . . . IDNS submits that this is not the proper legal standard and that the cited cases

<sup>59/</sup> See also City of West Chicago Comments at 49.

do not require application of such a standard to this matter. (page 31)

Response:

The "obviously superior" standard is well established under both Commission and judicial precedents as the appropriate standard for the consideration of alternatives under NEPA. NEPA is a procedural statute that is designed to ensure that a decision having substantial environmental impacts is guided by a reasonably informed consideration of alternatives. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 558 (1978); Rochester Gas & Elec. Corp. (Sterling Power Project, Nuclear Unit No. 1), CLI-80-23, 11 NRC 731, 736 (1980). It is well established that a proposed action need not be rejected simply because it appears that an alternative is "marginally preferable." Rochester Gas & Elec. Corp., 11 NRC at 394. Instead, the Commission has adopted the "obviously superior" standard as the appropriate yardstick against which alternatives are to be measured. This interpretation has been upheld by the courts, Seacoast Anti-Pollution League v. Nuclear Regulatory Comm'n, 598 F.2d 1221 (1st Cir. 1979); New England Coalition on Nuclear Pollution v. Nuclear Regulatory Commission, 582 F.2d 87 (1st Cir. 1978), as has a substantially equivalent standard used by EPA. See Roosevelt Campobello International Park Comm'n v. EPA, 684 F.2d 1041, 1046-47 (1st Cir. 1982).

It is true, as the IDNS asserts, that the NRC has in the past applied the "obviously superior" standard principally



to the siting of nuclear power plants. (That is hardly surprising, considering that such decisions are the principal ones to which the Commission has in the past been required to apply NEPA.) However, the IDNS has not cited any case in which the Commission has employed a standard other than the "obviously superior" standard for other types of siting decisions. Instead, the IDNS argues that because the established NRC precedents involve siting decisions for nuclear reactors that have not "already caused damage to the environment," IDNS Comments at 33, those precedents are not applicable to the current case.

The IDNS's argument boils down to an assertion that a decision concerning the siting of an existing thorium tailings pile is more important, and hence requires stricter standards, than a decision concerning the appropriate siting of a new nuclear reactor. Considering the relative environmental concerns involved (and in particular the level of risk presented by a "worst case scenario" in each instance), this assertion is patently ridiculous on its face. If anything, the "obviously superior" standard provides the strictest standard against which the staff's NEPA analysis in this case may properly be judged.<sup>60/</sup>

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<sup>60/</sup> The IDNS also suggests that the "obviously superior" standard should only be applied when the proposed site has been chosen with the participation and approval of local and



Comment:

1. On Page 5-63 it is stated that: . . . There would be no unavoidable adverse impacts associated with demographic issues or taxes at either the West Chicago site or the selected alternative sites." How would the adverse impacts on taxes at West Chicago be avoided? (page A-1)

Response:

Property taxes in West Chicago are paid to DuPage County, not the City of West Chicago. Kerr-McGee corrected the data set out in the DSFES concerning Kerr-McGee's payment of taxes to the County. Kerr-McGee Comments, 24-25, 40, Table 7. In the most recent year for which Kerr-McGee has data (1981), Kerr-McGee's tax payments constituted 0.003 percent of the total taxes collected by the County. Id. Table 7. The small parcel that is proposed for the disposal cell could never figure significantly in the local tax base regardless of the disposition of the tailings.

Comment:

2. On page 8-1 of the DSFES, it is stated that: "Monetary costs and benefits accruing to parties other than the Kerr-McGee Chemical Corp. are not considered." What is the basis for not considering monetary costs and benefits accruing to parties other than Kerr-McGee? (page A-1)

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(Footnote Continued)

state authorities. There is nothing in NEPA that even remotely suggests that state and/or local approval of a proposed project has any impact whatsoever on federal agencies' responsibilities under that statute. Moreover, there can be little doubt that the State has been accorded the opportunity to participate fully in the evaluation of the alternatives under consideration here.

Response:

The evaluation of the monetary costs and benefits of parties other than Kerr-McGee would serve to divert the analysis from its appropriate focus on stabilization. As the DSFES explains, the excluded items might include the benefit to the mine owner in avoiding the cost of the restoration of the pit that would be used for disposal or the costs or benefits to the owner of the farmland site that would be entailed by the use of that site for waste disposal. As the examples reveal, the evaluation of these costs and benefits would require the consideration of matters that are not directly connected with stabilization and would entail considerable speculation.

Comment:

4. In the DSFES, it is stated that the ponds formerly used for settling of suspended solids have been be [sic] excavated below the water table into highly permeable, loosely consolidated sands and gravels. (DSFES at 4-1) Since these excavated areas may not be uniformly compacted, the structural integrity of such areas would be questionable. How was it be [sic] determined that the fill within the excavated pond areas would be uniformly compacted and that the 2 foot thick clay liner would be adequately supported over the time period required? What action would be taken if the liner is not uniformly supported and differential settling results in localized liner failure? (page A-2)

Response:

The pond excavations will be backfilled to approximately the level of the top of the "E" stratum with coarse-grained materials. These materials will be compacted to a density comparable to the in-situ coarse-grained

materials, which have been shown to have properties suitable to support the disposal cell. Properties of the coarse-grained materials are summarized in Volume III of the Kerr-McGee Engineering Report. Additional fill above the "E" stratum will be comprised of coarse-grained or fine-grained soil, as appropriate and will be compacted to appropriate densities.

After closure, the proper performance of the disposal cell does not depend upon a totally intact cell liner. The function of the liner is important only during construction. After closure, leachate will be controlled by the cell cover.

Comment:

6. It is stated on page 5-24 of the DSFES that groundwater impacts were analyzed using a "modified version of a three-dimensional solute transport model that was developed at Oak Ridge National Laboratory." The original model, AT123D Solute Transport Model, is only applicable to saturated conditions. Has NRC verified that the model as modified can accurately analyze groundwater impacts in the saturated-unsaturated conditions? How did NRC verify this? (page A-4)

Response:

The modifications to the model described in the DSFES are minimal. One modification incorporates the effects of travel through the unsaturated zone on the size and timing of the groundwater source term. The other modification represents a more conservative calculation of the retardation factor used in the model. Neither modification represents a

change in the computational philosophy of the model, and no "verification" of the modified model is required.

The parameters selected for analyzing the West Chicago site and the alternatives provide conservative predictions of site behavior. The important result of the analyses is the fact that none of the sites studied was shown to be superior to the West Chicago site. In every instance, predicted concentrations of radioactive materials and non-radioactive materials in the groundwater around the West Chicago site were smaller than predicted concentrations around any of the alternative sites.

Comment:

8. Under the Proposed Action, what would be the maximum total dose rate to an individual at the site boundary, taking into account all pathways of exposure? How was this determined? What were the input parameters and inputs in the computer codes? How were UDAD-MIDOS codes modified to account for thorium series? What were the values for the specific changes? (page A-4)

Response:

Kerr-McGee has not attempted to reproduce the NRC's calculation. The calculation of the dose to the maximally exposed individual is discussed in detail in Exhibit 1.

Comment:

11. Figure 5.3, "Radon Release Rate from Buried Wastes with Cover Intact," indicates that after about 500 years the Radon-222 release rate will drop-off significantly. On page 5-53, it is indicated that this decrease in Radon-222 release from each containment system is due to the radioactive decay of Radium-226. Is figure 5.3, which depicts this decrease as beginning after only

500 years, accurate? How does Thorium-230 contribute to Radium-226 activity within the wastes? (page A-5)

Response:

The radon release is largely determined by the radium-226 content of the uppermost layer of waste. Radon release will track the inventory of radium-226, which has a half life of 1602 years. Thus, in 1000 years, the radium inventory will decrease to 65% of its original value. This is consistent with the Figure 5.3 of the DSFES. However, if the radium-226 inventory is supported by thorium-230, then the rate of decrease in radium-226 will track that of thorium-230, which has a half-life of 80,000 years.

Comment:

17. There appears to be an inconsistency as to when the north berm would be constructed. When will the north berm be constructed? (page A-8)

Response:

The north berm section will be constructed last. It appears that the second paragraph of Section 3.2.1 of the DSFES is incorrect. The first sentence of the paragraph presently reads:

"After construction of the swale, initial north and south berm sections would be constructed (Appendix B, Section B.2)."

The sentence should read:

"After construction of the swale, initial west and south berm sections would be constructed."

This is clearly defined in Volume IX of the Kerr-McGee Engineering Report, Section 9.4.2.2.3, Berm Construction.



Comment:

18. What would be the distances between the edges of the cell and the property lines for the Proposed Action? (page A-8)

Response:

The shortest distance between the waste in the cell and the property line is 149 feet. This is shown on Sketch 260, Section C-C and Section D-D in Volume IX of the Kerr-McGee Engineering Report. This distance is also shown on Figure 3.1 of the DSFES.

Comment:

20. . . . Considering continuous expansion of the size of the population within 50 miles of the West Chicago site, the effective dose equivalent to the general public for the proposed action appears to be low. How would this dose change under failure of the waste containment structure? (page A-9)

Response:

The radon flux from the cell is not appreciably affected by the removal of the outermost layers of the cell. For example, if the top 120 cm of the cell were removed -- an assumption that is physically implausible because it would entail the removal of the cobble layer -- the radon flux would be only  $1.78 \text{ pCi/m}^2\text{s}$ , which is still far below the UMTRCA limit of  $20 \text{ pCi/m}^2\text{s}$ . See supra at 74-75 & Exhibit 6. The cumulative health effects arising from any radon release from the cell would be trivial.

Comment:

21. Since staff determined that the material at the Rare Earths Facility is not low-level radioactive waste, should not staff have found that the disposal



limits on low-level radioactive waste do not apply? Why do the allocations of disposal capacity for low-level radioactive waste contained in the LLRWPA make evaluation of disposal of 11e.(2) byproduct material -- which is not low-level radioactive waste -- at the three interim sites unnecessary to satisfy NEPA? (page A-10)

Response:

Whether or not the statutory provisions setting quantity limits on the disposal of low-level radioactive waste at the three existing LLW sites apply to 11e.(2) byproduct material as a technical matter, it is clear that disposal of the West Chicago wastes at one of those sites would be inconsistent with the intent of the statute. The whole purpose of the statutory limit on low-level waste at those sites is to preserve the extremely limited remaining capacity of those sites pending the availability of new LLW sites. As IDNS is well aware, new LLW sites will not be available for some time to come to relieve the pressure on the three existing sites. It is implausible to suggest that one of those sites should be forced to make room for millions of cubic feet of byproduct material, contaminated soil, and rubble from West Chicago.<sup>61/</sup>

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<sup>61/</sup> For the same reasons, EPA's suggestion that disposal at one of the three existing sites after December 31, 1992, EPA Comments at 7, does not merit further consideration.

D. U.S. Environmental Protection Agency

Comment:

The USEPA has rated this project EO2 (environmental objections; insufficient information) with significant reservations. Our most serious concern is that the projected organ doses for the Proposed Action and all alternatives show an exceedance of 4-15 times over the 25 millirem annual organ dose equivalent in 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, which USEPA promulgated under the Uranium Mill Tailings Radiation Control Act of 1978. (Cover letter)

Response:

EPA's central concern with the DSFES is that stabilization might result in violation of the requirement of 40 C.F.R. Part 192 limiting radiation dose (the 25 mrem rule). The alleged violation arises from construction activities at the site and thus affects any of the alternatives to stabilize the tailings -- whether onsite or offsite. Apparently it is EPA's view that no stabilization of the tailings should take place because all the options might violate the rule.

EPA's argument is completely inconsistent with the purpose of UMTRCA, which was to assure the stabilization of tailings. In any event, however, onsite stabilization would not result in violation of the rule, as shown by these comments and Exhibit 1.

Comment:

The projected lung and bone doses given to the maximally exposed individual during the Proposed Action and for all alternatives given on Table 5.11, page 5-44 indicate a potential violation [of] . . . the annual dose standard of 25 millirem/year (mrem/yr) dose equivalent (not effective dose equivalent) to an organ. . . . (page 1-2)

Response:

EPA has misused the information included in the DSFES in two significant ways. First, EPA has made an improper adjustment of the cumulative dose information in determining the annual dose. EPA observes that closure is estimated to require 420 workdays (84 workweeks), and thus it calculates the annual dose by dividing the cumulative dose set out in Table 5.11 by 1.6 (84 workweeks divided by 52 weeks). But the work at the site will not be carried out continuously; rather, stabilization activities will be interrupted for roughly 20 weeks/year because of the adverse weather conditions that are normally encountered at the site during winter. See supra at 5. Kerr-McGee estimates that onsite stabilization will take place over four years. As a result, the period for construction will be longer than that assumed by EPA, and the resulting annual dose will be reduced.

Second, EPA does not properly consider the effects of the methodology that was used by the staff in calculating the cumulative dose. The staff notes in the DSFES that calculations were performed using the radiation dose conversion factors ("DCFs") recommended by the International Commission on Radiological Protection ("ICRP"). See DSFES at 5-41. The ICRP DCFs are based on 50-year dose commitments -- that is, the dose that would be incurred over a 50-year period from ingestion of a radionuclide is assumed to all occur in the year of uptake. The EPA regulations, however, limit the dose in any one year to 25 mrem to body organs (75 mrem to the

thyroid and, in all cases, excluding the dose from radon and its daughters). For long-lived radionuclides, the annual dose commitment is considerably overstated by using the ICRP DCFs and, thus, the ICRP DCFs should not be used in assessing compliance with the 25 mrem rule.<sup>62/</sup>

The use of ICRP DCFs in the dose calculation set out in the DSFES have a very significant impact on the results. As shown by Exhibit 1, 95 percent of the dose to the bone is from the thorium radionuclides, including especially thorium-232. Because the ICRP DCFs are based on 50-year dose commitments, the dose in the one year following the uptake of a long-lived radionuclide is much less than that estimated using the DCFs. For thorium-232, the one-year dose for adults is about a factor of 50 times smaller than the 50-year dose. Geenhalgh, et al., Doses from Intakes of Radionuclides by Adults and Young People, U.K. NRPB-R162 (1985). Thus, the doses to the bone given in NRC Table 5.11 (if all from inhalation) should be divided by about 50 for determining compliance with the 25 mrem rule. Accordingly, the bone doses given in Table 5.11 readily meet the 25 mrem/year criterion. The same factors apply to the lung dose, showing compliance with the rule for that organ as well.

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<sup>62/</sup> EPA notes in its comments that the "annual dose equivalent" to which the EPA regulations make reference is not the same as the "effective dose equivalent."

Comment:

The presence of a bone dose indicates soluble materials which may be impacting other organs. Doses to other organs should have been computed. (page 2)

Response:

The comment indicates apparent confusion or unfamiliarity on the part of EPA of the dosimetric models that underly the dose conversion factors developed for estimating doses from the inhalation of radionuclides. The dosimetric models take into account: the deposition of material in the lung; the clearance, and thus the retention, of material from the lung; the translocation of the material to other organs; the deposition and retention of translocated materials in other organs; and the excretion or elimination of the material from the various organs. The lung model thus includes consideration of the fact that a fraction of any material taken into the lung will be translocated; that is, that there is no such thing as an "insoluble" material. The translocation -- or clearance -- time for a given material of course is a function of its relative solubility, along with other factors (size, chemical form for example).<sup>63/</sup>

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<sup>63/</sup> The clearance of inhaled radioactive materials is classified as D, W or Y. D class materials are cleared with a half-time of ten days or less, W class materials with a half-time of 10 to 100 days, and Y class materials with a half-time greater than 100 days.



The dose conversion factors thus include the effect of chemical and physical form and metabolic factors, along with the radiological characteristics. The calculated doses in the DSFES properly focus on bone and lung, as these are the target organs for the long-lived radionuclides involved at West Chicago. The calculation of the dose to "other organs," as suggested by the EPA, would have no meaning.

Comment:

The averages [of radioactive concentration] are very low compared to the peak values for the various waste components. When these components are moved, peak levels may make a substantial impact on the total allowable annual dose. (page 2-3)

Response:

By definition, the average radioactive concentration in the waste components is lower than some individual values and higher than others. The assessment of the health impacts is undertaken by assessing the consequences of stabilizing the entirety of each waste component. Contrary to EPA's assertions, it is the average concentration that is relevant in this assessment. The use of the peak values would overstate the risk; the use of low values would understate the risk.

Comment:

The choice of disposal for the thorium wastes in West Chicago, the least expensive solution, will result in the citizens of this community receiving greater health risks from the burial of the wastes and greater health risks in the projected future in comparison to the other alternatives. . . . The cumulative health effects for the period of long-term management is about 10 times greater for



the Proposed action over alternatives. . . . [T]he conclusion for onsite disposal in West Chicago is based primarily on economics in spite of the clear dosage reductions of offsite disposal. (page 3)

Response:

EPA's assertions are simply incorrect. The DSFES demonstrates that onsite disposal results in a lesser total radiation dose than offsite disposal. (Although the long-term dose from onsite disposal is greater than that of the alternatives, the dose during the action period is considerably less.) See Kerr-McGee Comments, Table 1. Moreover, the conclusion in the DSFES that onsite disposal is the preferred alternative is based upon examination of all relevant health, safety, environmental, and economic considerations. Even leaving economic considerations aside, the DSFES demonstrates the superiority of onsite disposal over offsite disposal. See id. at 2-6.

The EPA comments seem to single out long-term dose as the sole determinant of the suitability of onsite stabilization. This approach is incorrect because it ignores other environmental factors, such as the action-period radiation dose and groundwater impacts, that make disposal at West Chicago preferable to other alternatives. Moreover, EPA's comments fail to acknowledge the minimal long-term impacts of onsite disposal.

The DSFES estimates the cumulative long-term radiation impact of onsite disposal as some 0.019 health effects. DSFES, Table 5.22. Any reasonable person would

agree that this impact is trivial. By way of comparison, it may be estimated that roughly 500,000 of the current population within an 80 km radius of the West Chicago will die from lung cancer for reasons completely unrelated to the site.<sup>64/</sup> It is nonsensical to focus regulatory efforts at preventing the 0.019 fatal lung cancers that are conservatively estimated to be induced over a thousand-year period by onsite disposal.

Comment:

The projected radon release rates given in Figure 5.3, page 5-56 indicate little, if any, margin of error in meeting reasonably applicable guidelines for long-term management of radon emissions. The Department of Energy has recently issued guidelines for the long-term management of uranium materials at their sites. These guidelines could be reasonably applicable to the West Chicago Facility. Specifically . . . the long-term management guideline for uranium decay products in air is to be less than 0.5 picocuries/liter (pCi/l) anywhere outside the boundary of a contaminated area. Using data from Figure 5.3 and the following assumptions:

F = stability class  
U = wind speed = 2 meters/second  
Q = emission rate = 0.6 curies/year  
 $XQ/U = 5.5 \times 10^{-2} \text{ m}^{-2}$  (Workbook of Atmospheric Dispersion Estimates, D. Bruce Turner, Figure 3-5F)

Thus, X = air concentration at 100 meters =  
0.5 pCi/l

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<sup>64/</sup> The population within an 80-km radius of the West Chicago site is about 7.5 million people. Roughly 6-7 percent of this population, or 450,000 to 530,000 people, will die from lung cancer for reasons having no connection to the West Chicago site.

This is the Department of Energy guideline. These projections leave no margin for error. (page 4)

Response:

The regulatory requirement cited in the EPA comments has no proper legal application to the West Chicago site. EPA has established specific requirements that must be met by UMTRCA sites and these requirements do not include concentration limits.

In any event, if the calculation were performed using proper assumptions, the guideline would be satisfied in West Chicago. EPA indicates that the concentration limit is intended to be a "long-term management guideline." The calculation should thus be performed using assumptions as to atmospheric conditions that are typical of the area. A more appropriate assessment would thus apply D-stability (neutral) conditions, rather than F stability.<sup>65/</sup> Moreover, the average windspeed in the area is 17.6 km/h (4.9 m/s) (FES at 4-19) --

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<sup>65/</sup> Weather data from O'Hare Airport for the period 1981-85 indicate the following distribution of atmospheric stabilities:

<u>Stability Class</u>	<u>Percent</u>
A	0.7
B	4.9
C	10.7
D	54.7
E	11.7
F	19.1

not the speed of 2 m/s assumed by EPA. Using Turner's Workbook as suggested by EPA and the emission rate assumed by EPA of 0.6 curies/year, the concentration at 100 meters is shown to be 0.03 pCi/l. In short, if the calculation were performed appropriately, the concentration of uranium decay products is well below the guideline.

Comment:

Design calculations used to meet the radon emission standard in 40 CFR 192.32(b)(1)(ii) (20 picocuries per square meter per second . . .) should be included in the document. (page 4)

Response:

The calculation is described in detail in Volume XII of the Kerr-McGee Engineering Report (revised July 23, 1986). It shows that the expected radon flux from the completed cell is roughly 0.35 pCi/m<sup>2</sup>s, which is far below the regulatory requirement of 20 pCi/m<sup>2</sup>s. See also Exhibit 6.

Comment:

[S]ignificant contamination of groundwater at the facility has already occurred as shown by data presented in Appendix C. Radionuclide concentrations in groundwater measured between the years 1981 and 1984 indicate uranium contamination above 30 pci/l (0.04 milligrams/liter) and radium contamination (radium-226 + radium-228) above 5 pci/l. Private wells that can potentially draw in this contaminated water are adjacent to the site. (page 5)

Response:

As discussed above, contamination of groundwater in the glacial aquifer has ceased and the aquifer is cleansing

itself naturally. The dolomite aquifer is essentially at background.

No site monitoring wells consistently show radium concentrations above five picocuries per liter. Only seven measurements of radium-226 plus radium-228 (out of hundreds of measurements made over the years) show concentrations above 5 picocuries per liter. These seven measurements occurred in six separate wells at isolated dates. Subsequent analyses of water from these wells did not indicate elevated concentrations of radium. The seven measurements are therefore probably the result of analytical or sampling errors.

Uranium-238 concentrations above 0.04 mg/l are found only in shallow wells constructed near the factory and the waste management ponds. In particular, uranium-238 is found in concentrations above 0.04 mg/l in only three wells on the disposal site, B-4, B-10, and B-11. Uranium-238 is not found in any dolomite well in concentrations above 0.04 mg/l.

Overall, there is no significant radionuclide contamination of groundwater stemming from the site. Elevated levels of uranium are seen in monitoring wells located directly in or immediately beside former disposal areas, such as the ponds, because in those areas residual quantities of waste material are still located in the subsurface. However, uranium has extremely limited mobility in these circumstances; other monitoring wells located only a short distance away do

not have elevated uranium levels. Nor has uranium contamination travelled downward to the dolomite aquifer.

As for USEPA's suggestion that private wells may be affected, no private wells exist within one mile of the site that are completed in the glacial aquifer, and, as discussed above, no such wells are likely to be constructed in the future. The city's large public wells, some of which are finished in the dolomite aquifer,<sup>66/</sup> have never shown any effects from the site and will not be affected in the future.

Comment:

USEPA drinking water standards must be met at the edge of the disposal area, rendering moot any questions of private versus public supplies. Further, we propose compliance to [sic] groundwater standards for uranium at inactive sites promulgated on September 24, 1987 (52 FR 36000) under UMTRCA. These proposed standards are 30 pCi/l for combined U-238 and U-234 and should be considered in this case. (page 5)

Response:

All applicable water quality standards will be met at the edge of the disposal area. Detailed calculations demonstrating such compliance may be found in Volume II of the Kerr-McGee Engineering Report.

There is no legal basis for requiring Kerr-McGee to comply with regulations applicable to inactive sites, much

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<sup>66/</sup> The city's other wells draw from deeper aquifers.



less with proposed regulations that have not even been adopted. In any event, however, as discussed above, there is no basis for concerns as to radiological contamination from these wastes, since no such contamination is seen today. Moreover, the mobility of radionuclides will be reduced even further during stabilization through chemical neutralization of the wastes. The proposed uranium standard should therefore be met easily at the edge of the disposal area.

Comment:

Intrusion of water into a site would normally be a strong argument against its consideration; yet, three of four sites considered are in the saturated zone. . . . The FSES should indicate how these selections were made and whether there are any areas acceptable from a geological and groundwater impact perspective. (page 5)

Response:

Like some other commenters,<sup>67/</sup> EPA criticizes the DSFES because the alternatives considered turned out to be less attractive from an environmental perspective than the proposed action. On its face, this argument seeks to turn NEPA on its head -- that statute does not require an agency to make a continuous and exhaustive search of all possible alternatives until it discovers one that is superior to the proposed action. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519 (1978).

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<sup>67/</sup> See e.g., City of West Chicago Comments at 6.

EPA's criticism here ignores the fact that a large number of alternative sites have already been fully evaluated. Those sites are discussed in the original FES. The Licensing Board order pursuant to which the DSFES was prepared did not require the evaluation of additional sites; the decision to consider more sites was made by the NRC staff on its own and was, in Kerr-McGee's view, unnecessary in light of the substantial work that had already been done. Instead of criticizing the NRC staff for its selection of these sites, EPA and other commenters should be praising the staff for the extra care it has elected to take in ensuring that more than sufficient consideration is given to the site-selection issue and the evaluation of alternative sites. It should also be noted that the sites selected for evaluation in the DSFES were in categories suggested by critics of the original alternatives study who believed that sites of these types were improperly left out of that study.

Comment:

Consideration should be given to in site [sic] vitrification whereby soil or wastes can be electrically fused into a glass without removing it from the ground or waste pile. Vitrification may reduce waste handling, emissions and substantially inhibit, if not foreclose the leaching process. While electrical costs would be high, the trade off with other disposal options might make it feasible. At a minimum, vitrification could be explored with other alternatives. (page 5)

Response:

EPA suggests that NRC consider fusing the millions of cubic feet of wastes, soil, and rubble in West Chicago into

glass. Such an approach is obviously completely uneconomical and would pose environmental costs through demands for electrical power that would exceed any conceivable benefit. This is a perfect example of the kind of absurdity to which NEPA analyses are not meant to be pushed. It is incredible that EPA could seriously propose such an approach.

Comment:

Discharges to West Chicago's Sewage Treatment Plant must meet the requirements of the city's pretreatment program. As part of the alternatives analyses, the FES must quantify the volume and nature of the site wastes to be discharged and perform analyses to ensure that these wastes can be accommodated by the treatment system and that a pass through or interference will not occur. (page 6)

Response:

Kerr-McGee discharges only sanitary wastewater and facility laundry water to the City's Sewage Treatment Plant. The laundry water meets NRC's criteria for unrestricted release. There are no plans, either present or future, to discharge any other potentially contaminated water to municipal sewage facilities.

Stormwater from the site is not discharged directly to the Treatment Plant, but is instead impounded and tested prior to release to the storm sewer system. Kerr-McGee has applied to the State of Illinois for a NPDES permit to discharge stormwater generated from decommissioning and stabilization activities.

Comment:

The report states in Section 7.2.2, page 7-2 that surface water monitoring would be discontinued after 10 years post-closure. Surface water (water and sediment) monitoring should be continued for perpetuity or as long as any of the wastes are viable. (page 7)

Response:

There has never been any finding of significant surface-water impacts from the site. As noted above,<sup>68/</sup> past analyses of water quality in Kress Creek demonstrate the absence of any such impacts. Post-closure surface water monitoring is proposed, therefore, only as an extremely conservative measure, not on the basis of past or expected future impacts. Kerr-McGee proposes to cease surface-water monitoring after ten years if (and only if) monitoring during the ten-year period demonstrates the continued absence of surface water impacts from the site.

E. U.S. Department of the Interior

Comment:

1. Page 1-6, section 1.3.1 3rd paragraph. The statement that "there is no evidence of nonradiological contamination of the streams from the West Chicago site" appears to be inconsistent with data referenced to on page 4-77, Fitzgerald, et al. 1984, 1985. This is not to say that the West Chicago site is the source of contamination, only that it could be, based on existing data.

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<sup>68/</sup> See supra at 38-39; see also infra at 119.

Response:

The 1983 data indicate that the site is not the source of contamination, since for most species the concentrations in Kress Creek are higher in the upstream sample than in the downstream sample. Two species that show higher downstream concentrations, iron and copper, are constituents that are not indicative of contamination from the site. The data therefore strongly suggests that the site is not a significant source of contaminants to Kress Creek.

Comment:

2. Page 1-12, - Long-term impact to ground water due to the proposed action is listed as minimal. The mechanism(s) for reduction of such impacts to minimal levels should be discussed in the final statement.

Response:

The Kerr-McGee closure program is the mechanism for reducing the long-term environmental impacts of the wastes at the site to minimal levels. This program is discussed in detail in both the DSPES and the Kerr-McGee Engineering Report.

Comment:

3. Page 4-44, A figure of the Disposal Site showing the location of the boreholes shown in figures 4.13 and 4.14 would aid in the interpretation.

Response:

This information is provided in Figure 2-49 of Volume II of the Kerr-McGee Engineering Report.

Comment:

4. Page 4-85, section 4.7.2 Ground water -- Information on wells within 1 mile of the proposed action site and each of the alternatives would be of help in evaluating the potential for well contamination. Figures showing the location of wells close to the disposal locations and data on where these wells draw water from, their screening and casing data would provide information on how likely contamination would occur.

Response:

The few wells that are completed in the unconsolidated materials near the site are located east of the site in the DuPage River alluvium. The locations of these wells are shown in Figure 3-13 of the Law Engineering Report (August 1981).

Comment:

5. Page 4-85, section 4.7.2.1, Hydrology, 4th paragraph -- A figure showing the potentiometric surface of the water in the Silurian aquifer beneath the site would be of assistance in understanding the hydrology and contaminant migration in this aquifer.

Response:

The potentiometric surface of the Silurian dolomite aquifer is shown in Figure 2-69 of Volume II of the Kerr-McGee Engineering Report.

Comment:

6. Page 4-92, Table 4.22 -- It appears that the data shown in Table 4-22 are questionable since the Milli-Q water blank had relatively high organic halide concentrations in the 4th quarter of 1983 and the 1st quarter of 1984.

Response:

Kerr-McGee has conducted analyses on groundwater samples from the glacial and Silurian dolomite aquifers to identify and quantify any organic materials present in the



water. The results of those analyses, which are reported in the Kerr-McGee Engineering Report in Volume VIII, show that groundwater at the site does not contain measurable concentrations of organic materials. The Illinois Attorney General's office obtained similar results in analyzing samples from its own onsite wells in 1986.

Kerr-McGee investigated the high organic halide concentrations shown in Table 4.22 by comparing the TOX concentrations with the concentrations of inorganic chlorides in the water samples. The presence of inorganic chloride interferes with TOX analyses when the chloride is present in concentrations exceeding 100 times the organic halogen content. The comparison found that there was a direct relation between the inorganic chloride content and the resulting TOX concentration. The TOX measured in groundwater samples from the facility is therefore the result of analytical interference and does not represent elevated concentrations of halogenated organics in the groundwater. See Kerr-McGee Engineering Report, Vol. III at 2-64.

Comment:

7. Page 4-92, 2nd paragraph -- A figure showing the location of the 34 wells sampled in relation to the site and the direction of flow within the Silurian aquifer beneath the site would help in understanding these data. A table listing the chemical data from these wells would also be helpful. Chemical data from a Silurian aquifer well upgradient of the site to provide background concentrations should be included in the final statement.

Response:

The locations of the wells are shown on Figure 4.28 of the DSFES. The "F" and "B" wells are completed in the glacial aquifer. The "KM" wells are completed in the upper part of the Silurian dolomite aquifer. Detailed piezometric data for these wells, together with water quality data, are provided in Volume II of the Kerr-McGee Engineering Report.

As discussed above,<sup>69/</sup> background water quality in the Silurian dolomite aquifer in DuPage County is extremely variable and complex. It therefore cannot be characterized accurately with data from a single well. To better characterize background water quality in the glacial and Silurian dolomite aquifers, Kerr-McGee installed wells in the glacial aquifer upgradient of the site. An analysis of the quality of the water from this portion of the glacial aquifer, which recharges the Silurian dolomite aquifer immediately beneath the site, shows that the quality of the two is essentially identical. This indicates that the chemistry of the water in the Silurian dolomite aquifer beneath the Kerr-McGee site is determined principally by the quality of the recharging water upgradient in the glacial aquifer, rather than the site itself.

Comment:

9. Page 5-27, section 5.7.2.4, Chemicals in Groundwater -- Concentrations of RCRA priority organic pollutants have not been considered for calculation by the model. Since organics are

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<sup>69/</sup> Supra at 61-62.

present at the West Chicago facility it is assumed that they will be present at the final disposal site, therefore they should be included in the leakage calculations and presented in the final statement.

Response:

Exhaustive studies of the wastes and soils onsite show that RCRA priority organic pollutants are not present at the site (with the exception of one tailings sample that was contaminated by asphalt used for dust and emissions control). See Kerr-McGee Engineering Report, Vol. VIII, Ex. 1, App. B, Tables 4 and 5. Studies of groundwater quality have also shown the absence of organics.

Comment:

10. Page B-3, section B.1, Introduction -- Characterization of the materials in which the waste will be deposited should be considered in the facility design, particularly chemical compatibility with the wastes.

Response:

Kerr-McGee has considered the compatibility of the cell materials in the development of the closure plan. This consideration has included, among other things, observations of the lack of impact of waste materials on the native site materials. In addition, Kerr-McGee is conducting a long-term liner compatibility test in which changes in hydraulic properties of site clays in contact with waste leachate are measured over a period of more than a year. This test was begun in the summer of 1987 and will be completed in the fall of 1988.

Intermediate results to date show no adverse affects on the clay as a result of contact with the leachate.

F. State Representative Hensel

Comment:

The DSFES is limited in scope to the materials on the Kerr-McGee site itself and materials authorized to be stored on the site but not yet placed there. This sounds as if this could be a site for storage of Radioactive Wastes from outside West Chicago, including out of State wastes. If this is true, it is not in the best interest of the community and I am opposed to this completely.

Response:

Kerr-McGee agrees that it would be inappropriate to seek to transform this site into a generally available low-level waste facility. No such proposal is currently under consideration by the NRC; nor, Kerr-McGee believes, could such an approach be lawfully adopted under the governing statutes.

G. State Senator Karpiel

Comment:

The DSFES is limited in scope to the materials on the Kerr-McGee site itself and materials authorized to be stored on the site but not yet placed there. This sounds an ominous clue to me that the site may become a storage site for radioactive wastes from outside of West Chicago and perhaps outside of Illinois. I am in total opposition to any such possibility.

Response:

See the response to Representative Hensel's comment.

Comment:

[Y]ou are undoubtedly aware of West Chicago's proximity to the proposed site for the Superconducting Supercollider (SSC) project Illinois is attempting to win. Thus, this "preferred course of action" would be far from preferable to this effort.

Response:

There is no reason to believe that the Kerr-McGee proposal will have any impact whatsoever on the efforts of the State of Illinois to win the SSC project.

H. John W. Cooper, Ph.D.

Comment:

1. The DSFES, in section 1-7, states that the proposed action can only be denied if an alternative site(s) is identified that is obviously superior to the West Chicago site. This is contrary to NRC licensing procedures for other facilities. Interpreted in this manner, it would allow any applicant/licensee to make an application acceptable by simply submitting unacceptable alternatives.

Response:

As discussed above,<sup>70/</sup> the "obviously superior" standard is the standard traditionally used by the NRC in assessing alternative sites in an analysis under NEPA. The

alternatives assessed in the DSFES were selected by the staff, not by Kerr-McGee. The additional alternatives assessed in

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<sup>70/</sup> See supra at 95-96.

the original FES were originally analyzed by Kerr-McGee, but were selected on the basis of recommendations by state and federal agencies.

Comment:

4. . . . A number of studies have shown that even vehicle safety can be increased with a proper inspection, maintenance, and training program. The analysis performed in the DSFES uses general truck accident rates, yet vehicles hauling hazardous materials usually have a much better safety record because of the enhanced safety procedures (see OTA study on hazardous materials transportation).

Response:

It is appropriate to undertake the analysis of impacts using reasonable conservative (i.e., pessimistic) assumptions. Kerr-McGee has submitted data concerning the accident rates actually experienced in Illinois using vehicles like those that would be involved in stabilization activities. See Kerr-McGee Comments, Table 3. There is no reason to believe that the Kerr-McGee project would differ significantly from the norm.

Comment:

7. The evaluation of radiological impacts on page 1-14 states that the estimated doses represent insignificant increments to the radiation doses that would be received from background sources of radioactivity. . . . The documents states that the potential environmental impacts of the alternatives would be similar to the proposed action. Since radon-222 exposure is given in person-rem, this does not appear to be possible unless the population densities near the disposal sites are the same.



Response:

The DSFES indicates that following stabilization the maximally exposed individual would receive a bronchial epithelium dose of 0.0068 mrem/yr, which represents an "insignificant" increment to background. The population doses on page 1-14 of the DSFES refer to the "Action" period. As noted in footnote C of Table 5-11 (page 5-44, DSFES) more than 95% of the population dose due to cleanup itself occurs to people in the West Chicago area. There is no inconsistency.

Comment:

10. The transportation section on page 5-7 should be clarified. The volume of wastes remain the same for both onsite and offsite materials, therefore the truckloads themselves should remain the same. The number of trucks used, as opposed to truckloads, appears to be irrelevant and up to the contractor. The only difference is the number of miles trucks are driven, which is obviously greater for offsite disposal. However, the number of hours trucks operate on each site should remain the same, unless Kerr-McGee does not plan on moving some of the wastes even onsite.

Response:

The volumes of waste requiring movement by truck are quite different for the offsite and onsite disposal alternatives. First, because of the proximity of some material to the cell, some of the material will not require loading into trucks for onsite disposal. Rather, some material will be excavated and then placed directly in the cell by the earthmoving equipment. Moreover, onsite disposal will allow some 35,000 yd<sup>3</sup> of material to remain in place

during stabilization.<sup>71/</sup> If offsite disposal were pursued, these materials would have to be excavated.

In addition, waste volume is not the only factor that determines the number of trucks that will be required for each alternative. Large, off-road vehicles can and would be used for onsite disposal, whereas offsite transportation would require use of vehicles meeting statutory size- and weight-limit restrictions for the roads and highways over which travel proceeds. Hence, offsite disposal may increase the number of hours that trucks would operate on the site.

Of equal importance to types of vehicles used, the potential for public exposure is greatly reduced for the onsite disposal option. Onsite disposal involves movement of waste materials within a small area, allowing transport to be precisely managed and disposal activities to be fully controlled. Onsite disposal thus allows comprehensive dust-suppression activities. Moreover, onsite disposal allows the public to be removed from potential contact with the wastes as a result of accidents or the loss of materials during transport.

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<sup>71/</sup> Aug. 20 Tr. at 90-91 (Parker) (Kerr-McGee Comments, Ex. 2). Approximately 7,000 yd<sup>3</sup> of material would have to be double-handled if onsite stabilization were pursued, and thus offsite stabilization increases the net volume of wastes to be handled by 28,000 yd<sup>3</sup>. Id.

Comment:

14. The footnote on page 5-11 states that erodibility factor (K) values are normally presented for undisturbed soil, and that no information is available for exposed spoil material or for topsoil that has been reconstructed. For these calculations, the K values are published topsoil values. I submit that unconsolidated soils should be more prone to erosion than undisturbed soils, and this use is not a conservative, realistic use of the Universal Soil Loss Equation.

Response:

The quotation from Barfield, et al. (at page 5-11 of the DSFES) regarding the lack of information about K-values for exposed spoil piles and reconstructed topsoil addresses appropriate values for K immediately after the reconstructed topsoil has been placed. The value of K is defined as "the rate of soil erosion per unit of rainfall potential (index) from a unit plot which is tilled up and downslope, and has been kept in fallow for at least 2 consecutive years." The effects of tillage on erosion are accounted for separately in the USLE by the Cover Factor and the Practice Factor, C and P.

Soil erodibility (K) is generally considered to be a function of soil texture, organic content, soil structure, and permeability. Soil structure is related to the particle size distribution and the iron, aluminum, and silicon dioxide content of the soil, in addition to the organic matter content. Relations have been developed that allow appropriate values of K to be calculated or obtained using nomographs. Other parameters, such as soil structure, can be estimated conservatively, and conservatively large values of K can be

obtained using these methods. Such conservative procedures were used by Kerr-McGee in performing the erosion calculations presented in Volume VI of the Kerr-McGee Engineering Report. Erosion calculations prepared by the Staff in the preparation of the DSFES also used conservative estimates of erosion parameters.

Finally, it should be noted that soil erodibility is the parameter in the USLE least effected by reconstruction, since the parameter is measured in natural soils on plots that have been tilled. The soil erodibility of a tilled topsoil and a reconstructed topsoil will be the same if the other properties of the soil are the same.

The uses made of the USLE in the studies leading to the Kerr-McGee Engineering Report and the DSFES are common in engineering endeavors and have been endorsed by both the NRC and the EPA in guidance documents.

Comment:

15. On page 5-13, the DSFES states that if the topsoil at the site becomes completely eroded, the wastes would still be protected by the remaining 1-8m of cover material. The layer immediately beneath the topsoil, the clay-cobblestone intruder barrier . . . will not necessarily control radon emanation to the proposed levels, and in fact would be unlikely to do so. Permeable barriers, which include sand or cobblestones, do not retard radon to the same degree as clay or soil.

Response:

Even if the cell were eroded to the clay-cobble layer, the radon flux from the wastes would still be only 0.48 pCi/m<sup>2</sup>s, which is far less than applicable requirements and

comparable to the flux from normal soils in Illinois. See Exhibit 6; Kerr-McGee Engineering Report, Volume XII.

Comment:

18. Section 5.9.3, beginning on page 5-58, presents data related to gamma exposure, which is not a valid representation to high LET radiation from radon progeny. The cumulative health effects presented in Table 5.22 do not represent the range of values estimated from radon exposure and do not take into account the fact that I do not start from zero incidence. The US EPA estimates 5,000-20,000 fatal lung cancer cases per year from levels in the range of one pCi per liter. Since the affected population is not those near the site, but those within 50 miles (Chicago area), this is a substantial population.

Response:

The commenter's concerns and conclusions are inconsistent with the data in the DSFES and the extensive scientific literature underlying the development of risk factors for exposure to radiation.

It is correct that studies of populations exposed to low-LET radiation (gamma, x-ray) comprise a major source of information considered in the derivation of the risk factor employed in the DSFES ( $1.7 \times 10^{-4}$  effects per rem). However, the risk factor also is founded on the significant body of information from studies of populations whose dose resulted from high-LET radiation (alpha) -- uranium miners, radium-dial painters, and recipients of medically administered alpha-emitting radionuclides, such as thorium. See National Academy of Sciences, Committee on the Biological Effects of Ionizing Radiations, The Effects on Populations of Exposure to



Low Levels of Ionizing Radiation: 1980 ("BEIR III"). Thus, the commenter's assertion that the information discussed in section 5.9.3 of the DSFES applies solely to gamma exposure is not correct. The risk estimates presented in Table 5.21 are from BEIR III, among other sources, and certainly consider high-LET effects.

In addition, the term "dose equivalent" was introduced in the radiation-protection field to permit better correlation of the effects of exposure with different qualities of radiation. See, e.g., ICRP No. 26, page 3. The dose-equivalent term, the rem, is the product of the absorbed dose (energy) and a "quality factory" that is determined for different types of radiation. For low-LET radiation, the quality factor is one; for alpha radiation, a high-LET radiation, the quality factor is 20. Thus an absorbed dose of one rad of gamma is one rem, whereas an absorbed dose of one rad of alpha is 20 rem. The DSFES presents doses in rem (or millirem) -- that is, in dose-equivalent terms -- and the risk factor thus compensates for the different types of radiation.

The risk factor employed in the DSFES is also acknowledged to be conservative, because the risk factor applied for low-dose exposures is derived on the basis of linear extrapolation from observed effects at high doses. This extrapolation may lead to an overestimate of the radiation risks, but is considered appropriate to assess an upper limit of risk (ICRP 26, page 7). Indeed, the National



Academy of Sciences' Committee on the Biological Effects of Ionizing Radiations recently concluded, after consideration of the data, that the lifetime risk of lung-cancer mortality due to lifetime exposure to radon daughters was less than half the risk previously published in the BEIR III report. National Academy of Sciences, Health Risks of Radon and Other Internally Deposited Alpha-Emitters, 76 (1988) (BEIR IV). Moreover, the cumulative health effects presented in Table 5.22 are postulated "excess" effects; thus, contrary to the comment, the natural incidence is not a consideration.

The comment regarding EPA's estimate of lung cancer cases in the population from exposure to background levels of radon is simply not relevant to the situation at hand. There will be no measurable radon in the environment from the disposal in West Chicago.<sup>72/</sup> Measurements show radon levels from uncovered uranium tailings piles containing large concentrations of radium-226 fall to background levels at a distance of less than a kilometer to a few kilometers. Indeed, the National Academy of Sciences Committee concluded " . . . persons living at distances greater than a kilometer from most uncontrolled uranium mill tailings piles, and perhaps somewhat closer to some piles, will experience no significant increase in lifetime radon lung cancer risk due to

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<sup>72/</sup> Supra at 74-75.

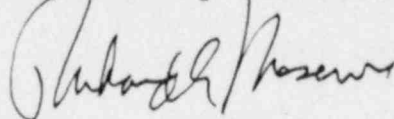
radon from the pile. National Academy of Sciences, Uranium Mill Tailings Study Panel, Scientific Basis for Risk Assessment and Management of Uranium Mill Tailings, 3 (1986). Surely, it is reasonable to conclude that there will be no significant increased risk associated with a disposal cell from which there will be no detectable radon emanation.

As a final point, the DSFES cumulative health effects reported in Table 5.22 of the DSFES apply to the Chicago-area population -- the model extends to 80 kilometers. Even so, the calculated cumulative health effect for the proposed alternative for this population over the 1000-year period is 0.019, equivalent to one hypothetical additional ~~person~~ in the entire population in a more than 52,000-year ~~time~~ frame. This impact is clearly insignificant.

CONCLUSION

The analysis of the comments on the DSFES serves to confirm that onsite disposal pursuant to the Kerr-McGee Stabilization Plan is the preferred alternative.

Respectfully submitted,



Ivan L. Denny  
Edwin T. Still  
John C. Stauter  
KERR-McGEE CHEMICAL CORPORATION  
123 Robert S. Kerr Avenue  
Oklahoma City, OK 73125  
(405) 270-3817

Peter J. Nickles  
Richard A. Meserve  
Sonya D. Winner  
COVINGTON & BURLING  
1201 Pennsylvania Ave., N.W.  
P.O. Box 7566  
Washington, D.C. 20044  
(202) 662-6000

Counsel for Kerr-McGee  
Chemical Corporation

March 10, 1988





## SENE CONSULTANTS LIMITED

52 West Beaver Creek Road  
Unit No. 4  
Richmond Hill, Ontario  
Canada L4B 1G5  
Tel: (416) 764-9380  
Fax: (416) 764-9386

30475

8 March 1988

Mr. R.A. Meserve  
Covington and Burling  
1201 Pennsylvania Avenue N.W.  
P.O. Box 7566  
Washington, D.C.  
20044

RE: NRC ESTIMATES OF DOSES TO THE GENERAL PUBLIC DURING ACTION  
PERIOD

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Dear Richard:

Further to recent telephone conversations, Dr. Leo Lowe and I have reviewed Section 5.9.1.1 of the NRC's Draft Supplement to the FEIS related to the decommissioning of Kerr McGee's rare earth facility in West Chicago, Illinois. In addition, we have recalculated the radioactive emissions, using information recently developed by Kerr McGee. The following comments are offered:

### 1. NRC ESTIMATES OF RADON EMISSION

The NRC estimate that 20% of the radon-222 (and 10% of the radon 220) present in the waste would be released to the air (Draft Supplement page 5-42).

Taking the inventories of radium-226 and radium-228 in the wastes given in Table 2.4 into account, results in emissions of 5.8 Ci for radon-222 and 20 Ci for radon-220. These emissions are 50% of the emissions reported by NRC in Table 5.10.

Hence, while the methodology used by NRC seems reasonable, it is not clear from the information available to us where the discrepancy arises. Using NRC methodology, it appears that the radon releases (and hence doses) have been overestimated somewhat.

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## 2. THE NRC APPROACH TO RADIOACTIVE DUST ESTIMATION

The NRC estimates of radioactive dust emissions were not based on a detailed work schedule. Alternatively, the NRC used an EPA emission factor for open storage operations (Draft Supplement page 5-42) applied to the mass of material to be excavated and relocated. The radioactive releases, shown in Table 5.10 of the Draft Supplement, were then estimated by prorating the mass inventory for three source categories (factory site, disposal site and "other") by the average radionuclide concentration in each of the source categories (Table 5.9 of Draft Supplement). NRC, on page 5-40 of the Draft Supplement, indicates that the Gaussian plume model in the MILDOS code was used to estimate air concentrations. Finally, on page 5-41 of the Draft Supplement, the NRC indicates that ICRP dose conversion factors were used in their assessment.

## 3. RECALCULATION OF RADIOACTIVE DUST EMISSIONS

As noted above, the NRC used a 1977 EPA emission factor and total mass of material to be relocated to estimate radioactive dust emissions. Recently, Kerr McGee provided information to enable a more detailed calculation which incorporates the current waste handling/construction time schedule. These data, converted to a form useful for estimating dust emissions, are summarized in Table 1.

The procedures we used to estimate the dust emission rates and subsequently, the particulate radionuclide emissions, are those described by U.S. EPA for use in aggregate handling (Photocopies of relevant pages are attached as Appendix A).

The other sources of data needed to use the EPA model are:

- . volume and schedule - Kerr McGee as indicated above
- . radiological characteristics - Table 2.3 of Draft Supplement
- . density - Table 2.4 of Draft Supplement
- . silt and moisture content, taken from geotechnical borehole data provided by Kerr McGee.

The other parameters used and assumptions made, are summarized in Table 2 and 3, respectively.

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Table 1

## ESTIMATED VOLUMES, DENSITIES AND MASSES OF WASTE COMPONENTS

Material Source and Type	Estimated Volume (cubic metres)	Estimated Mass (Tonnes)	Number of 8-Hour Days per Year			% of Total Construction Period			Estimated Mass to be Removed / Year		
			Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Factory Site											
Cement-Asbestos (Transite)	250	595		20		0	100	0	0	595	0
Reinforced Concrete	4800	11424	6	8	6	30	40	30	3427	4570	3427
Block and Brick	6000	14280			25	0	0	100	0	0	14280
Misc. Rubble	900	2142	1	2	1	25	50	25	536	1071	536
Contaminated Soil	139900	222441		20		0	100	0	0	222441	0
Intermediate Site											
Contaminated Soil	5700	9063			10	0	0	100	0	0	9063
Disposal Site											
Tailings	18700	19261		31		0	100	0	0	19261	0
Pond Sediment Pile	3800	3420	7			100	0	0	3420	0	0
Pond 2,3,4,5 Sediment	9900	8910	25	8		76	24	0	6772	2138	0
Pond 1 Sediment	20600	18540		68		0	100	0	0	18540	0
Contaminated Soils	26700	42453	13	18	13	30	41	30	12524	17406	12524
Miscellaneous											
Rare Earth Chemicals	340	598	5			100	0	0	598	0	0
Incinerator Ash	340	201	5			100	0	0	201	0	0
Temporary Detention Pond	1900	1710	0		4	0	0	100	0	0	1710
Off Site materials											
Reed Kappeler Park	13000	18285		38		0	100		0	18285	0
Neighborhood Cleanup	26800	42612	24	72		25	75		10653	31959	0
Waste Treatment Plant	43600	69324	54	54	54	33	33	33	23085	23085	23085
Totals	321730	485259	140	339	113				61215	359351	64624

Table 2

## MODEL PARAMETERS

<u>Parameter</u>	<u>Value</u>	<u>Dimen- sions</u>	<u>Origin</u>
Particle size (K) multiplier	0.73	-	Table 11.2.3-2 Aerodynamic Particle Size Multiplier pp. 11.2.3-2 U.S. EPA**
Material silt (S) content	37.1	%	Average from field borehole data (supplied by K.M.)
Mean wind (U) speed	4.90	m/s	Section 4.3.2 winds pp.4-19 Final Envir. State
Drop height (H) (batch drops)	2.0	m	SENEs Estimate
Soil moisture (M) content	21.2	%	Average from field borehole data* (supplied by K.M.)
Dumping (Y) device capacity	2.3+	m <sup>3</sup>	Kerr McGee
# Days precip. (P) >0.01 "/yr	120	days	Figure 11.2.1-1 mean # Days with $\geq 0.01$ precip. in U.S. pp. 11.2.1-4 U.S. EPA**
% time wind (F) $\geq 12$ mph	31.6	%	Table 4.5 joint frequency of avg. wind speed pp. 4-21 final environmental statement.

\* Data verified by Table 5-3 engineering properties of waste mix, page 5-6, Vol. V. Kerr McGee engineering Report (Value 19.6%).

\*\* Compilation of air pollution emission factors Vol. I, 4th Ed., September 1985.

+ 3 cubic yards

Table 3

ASSUMPTIONS

- Quantities of steel tanks, pipe and equipment were omitted from the calculations for the following reason:

Kerr McGee proposes to spray paint all such equipment prior to demolition -- it is assumed that dust would be fixed.

- Total Suspended Particulate contribution from vehicular traffic was omitted from the calculation:

it was assumed that temporary site roads would be constructed of materials with negligible radioactive content.

- Mass used for calculations was on a dry mass basis.
- calculations based on working days only.
- calculations include "batch" drops and wind erosion.

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The predicted radionuclide emissions - NO CONTROLS ASSUMED - are summarized in Table 4. NRC, on page 5-42, indicates that dust emissions could be reduced by 50% by the use of water sprays alone. As indicated in Table 4, the NRC estimates are comparable to the SENES estimates (assuming 50% control) except for uranium for which the NRC estimate is high by a factor of about 420%.

The EPA write-up suggests that dust emissions can be further controlled by up to 90%, however, we have not investigated this aspect.

#### 4. RADIATION DOSES

As indicated in the foregoing, the NRC estimates of radioactive dust emissions are comparable to those of SENES, except for uranium, for which the NRC estimates are substantially higher.

The NRC does not provide sufficient information in the Draft Supplement to permit an examination of all of their assumptions or model applications (e.g. MILDOS). NRC (page 5-41) states that it uses radiation dose conversion factors (DCF's) based on the recommendations of the ICRP. The ICRP DCF's are based on 50 year dose commitments. The implications of this should be clearly understood.

The inhalation dose from each radionuclide released from the work site is the product of a number of factors: the amount emitted, the dispersion of the radionuclides in the environment, breathing rate and other receptor characteristics, and the radionuclide-specific DCF's. Since the dispersion in the environment and the receptor characteristics are the same for each radionuclide, the dose to the maximally exposed individual is proportional to the product of the amount released and the DCF. For illustration, these factors are shown in Table 5 for dose to the bone (marrow), the most exposed organ according to NRC (Table 5.11). (Similar observations apply if the bone surface is used.) The DCF's are taken from ICRP Publication 30. The most insoluble form of the radionuclide (ICRP solubility Y, W or D as appropriate) is assumed. The emissions are for the Proposed Action alternative. (The emissions for the other alternatives are essentially the same.)

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Table 4

## ESTIMATED EMISSION DURING REMEDIAL ACTION - DRY WEIGHT BASIS

Source <u>Location</u>	U-238 <u>(Ci)</u>	Ra-226 <u>(Ci)</u>	Th-232 <u>(Ci)</u>	Th-230 <u>(Ci)</u>	Ra-228 <u>(Ci)</u>
Factory Site	5.62E-04	6.90E-05	8.58E-04	1.02E-04	8.58E-04
Intermediate Site	1.71E-05	7.93E-07	2.78E-06	3.97E-07	2.78E-06
Disposal Site	1.42E-03	7.63E-03	3.13E-02	3.69E-03	5.78E-02
Miscellaneous	1.52E-06	4.76E-06	1.39E-05	2.80E-06	1.82E-05
Off Site	<u>2.32E-04</u>	<u>1.65E-03</u>	<u>9.92E-03</u>	<u>7.28E-04</u>	<u>5.95E-03</u>
Total	2.23E-03	9.36E-03	4.21E-03	4.52E-03	6.46E-02
50% Control	1.12E-03	4.20E-03	2.10E-03	2.25E-03	3.23E-02
Table 5.10 of Draft Supplement	4.70E-03	4.40E-03	1.80E-02	2.10E-03	3.00E-02
Ratio NRC/ 50% Control	4.2	1.05	0.86	0.93	0.93

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Table 5 shows that more than 95% of the dose to the bone is from the thorium radionuclides, especially thorium-232. As stated previously, the ICRP DCF's are based on 50-year dose commitments. The dose in one year following uptake of long-lived radionuclides is much less. For thorium-232, the one-year dose for adults is about a factor of 50 times smaller than the 50-year dose (Greenhalgh et al., 1985, "Doses from Intakes of Radionuclides by Adults and Young People", U.K. NRPB-R162.)

This implies that the doses to the bone given in NRC Table 5.11 (assumed to be all or nearly so from inhalation) should be divided by about 50 for comparison to an annual dose criteria, such as the EPA criterion of 25 mrem/year. On this basis alone, the bone doses given in Table 5.11 meet the EPA 25 mrem/year criterion. The same arguments can also be used for the lung dose.

#### 5. CONCLUSIONS

Overall, except for uranium, the radioactive dust emissions used by NRC are comparable to the SENES estimate.

When the 50-year dose commitment, which is incorporated in ICRP dose conversion factors, is recognized, all of the doses to the maximally exposed individual shown in Table 5.11 are below EPA's 25 mrem per year limit.

Please let me know if further clarification is required.

Yours very truly,

SENES CONSULTANTS LIMITED

Douglas B. Chambers, Ph.D.  
Principal

Att.

cc: E.T. Still, Kerr McGee

ls

SENES



Table 5

<u>Radionuclide</u>	(A) Amount Emitted During Remedial Actions <u>(Ci)<sup>1</sup></u>	(B)  DCF <sup>2</sup> <u>(rem/pCi)</u>	(C)  A x B <u>(rem)</u>
uranium-238	$4.7 \times 10^{-3}$	-3	-
thorium-232	$1.8 \times 10^{-2}$	$1.5 \times 10^{-3}$	$2.7 \times 10^{-5}$
thorium-230	$2.1 \times 10^{-3}$	$2.6 \times 10^{-4}$	$5.5 \times 10^{-7}$
radium-228	$3.0 \times 10^{-2}$	$2.7 \times 10^{-6}$	$8.1 \times 10^{-8}$
radium-226	$4.4 \times 10^{-3}$	-3	-
			<hr/>
			$2.8 \times 10^{-5}$

1. From NRC Table 5.10 for the Proposed Action alternative.
2. From ICRP Publication 30 for dose to the bone marrow from inhalation of the most insoluble form of the radionuclide.
3. A dash, in lieu of a figure, means that the dose to the bone marrow from inhalation is small relative to the dose to other organs and so is not included in ICRP 30.

APPENDIX A

EXCERPT FROM

U.S. EPA COMPILATION OF  
AIR POLLUTANT EMISSION FACTORS.  
VOL. I: STATIONARY POINT AND AREA SOURCES  
4th EDITION  
SEPTEMBER 1985

### 11.2.3 AGGREGATE HANDLING AND STORAGE PILES

#### 11.2.3.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, during material loading onto the pile, during disturbances by strong wind currents, and during loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

#### 11.2.3.2 Emissions and Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Also, emissions depend on three correction parameters that characterize the condition of a particular storage pile: age of the pile, moisture content and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, its potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents from aggregate transfer itself or high winds. As the aggregate weathers, however, potential for dust emissions is greatly reduced. Moisture causes agglomeration and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and the drying process is very slow.

Field investigations have shown that emissions from aggregate storage operations vary in direct proportion to the percentage of silt (particles < 75  $\mu\text{m}$  in diameter) in the aggregate material.<sup>1 3</sup> The silt content is determined by measuring the proportion of dry aggregate material that passes through a 200 mesh screen, using ASTM-C-136 method. Table 11.2.3-1 summarizes measured silt and moisture values for industrial aggregate materials.

#### 11.2.3.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles are contributions of several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

TABLE 11.2.3-1. TYPICAL SILT AND MOISTURE CONTENT VALUES  
OF MATERIALS AT VARIOUS INDUSTRIES

Industry	Material	Silt (%)			Moisture (%)		
		No. of test samples	Range	Mean	No. of test samples	Range	Mean
Iron and steel production <sup>a</sup>	Pellet ore	10	1.4 - 13	4.9	8	0.64 - 3.5	2.1
	Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.1	5.4
	Coal	7	2 - 7.7	5	6	2.8 - 11	4.8
	Slag	3	3 - 7.3	5.3	3	0.25 - 2.2	0.92
	Flue dust	2	14 - 23	18.0	0	NA	NA
	Coke breeze	1		5.4	1		6.4
	Blended ore	1		15.0	1		6.6
	Sinter	1		0.7	0	NA	NA
	Limestone	1		0.4	0	NA	NA
Stone quarrying <sup>b</sup> and processing	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
Taconite mining <sup>c</sup> and processing	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.3	0.96
	Tailings	2	NA	11.0	1		0.35
Western surface coal mining <sup>d</sup>	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
	Overburden	15	3.8 - 15	7.5	0	NA	NA
	Exposed ground	3	5.1 - 21	15.0	3	0.8 - 6.4	3.4

<sup>a</sup> References 2-5. NA = not applicable.<sup>b</sup> Reference 1.<sup>c</sup> Reference 6.<sup>d</sup> Reference 7.

Adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The quantity of particulate emissions generated by a batch drop operation, per ton of material transferred, may be estimated, with a rating of C, using the following empirical expression<sup>2</sup>:

$$E = k(0.00090) \frac{\left(\frac{s}{5}\right) \left(\frac{U}{2.2}\right) \left(\frac{H}{1.5}\right)}{\left(\frac{M}{2}\right)^2 \left(\frac{Y}{4.6}\right)^{0.33}} \quad (\text{kg/Mg}) \quad (1)$$

$$E = k(0.0018) \frac{\left(\frac{s}{5}\right) \left(\frac{U}{5}\right) \left(\frac{H}{5}\right)}{\left(\frac{M}{2}\right)^2 \left(\frac{Y}{6}\right)^{0.33}} \quad (\text{lb/ton})$$

where: E = emission factor  
 k = particle size multiplier (dimensionless)  
 s = material silt content (%)  
 U = mean wind speed, m/s (mph)  
 H = drop height, m (ft)  
 M = material moisture content (%)  
 Y = dumping device capacity, m<sup>3</sup> (yd<sup>3</sup>)

The particle size multiplier (k) for Equation 1 varies with aerodynamic particle size, shown in Table 11.2.3-2.

TABLE 11.2.3-2. AERODYNAMIC PARTICLE SIZE  
 MULTIPLIER (k) FOR  
 EQUATIONS 1 AND 2

Equation	< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
Batch drop	0.73	0.48	0.36	0.23	0.13
Continuous drop	0.77	0.49	0.37	0.21	0.11

The quantity of particulate emissions generated by a continuous drop operation, per ton of material transferred, may be estimated, with a rating of C, using the following empirical expression<sup>3</sup>:

$$E = k(0.00090) \frac{\left(\frac{s}{5}\right) \left(\frac{U}{2.2}\right) \left(\frac{H}{3.0}\right)}{\left(\frac{M}{2}\right)^2} \quad (\text{kg/Mg}) \quad (2)$$

$$E = k(0.0018) \frac{\left(\frac{s}{5}\right) \left(\frac{U}{5}\right) \left(\frac{H}{10}\right)}{\left(\frac{M}{2}\right)^2} \quad (\text{lb/ton})$$

where: E = emission factor  
 k = particle size multiplier (dimensionless)  
 s = material silt content (%)  
 U = mean wind speed, m/s (mph)  
 H = drop height, m (ft)  
 M = material moisture content (%)

The particle size multiplier (k) for Equation 2 varies with aerodynamic particle size, as shown in Table 11.2.3-2.

Equations 1 and 2 retain the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equations, as given in Table 11.2.3-3. Also, to retain the quality ratings of Equations 1 or 2 applied to a specific facility, it is necessary that reliable correction parameters be determined for the specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site specific values for correction parameters cannot be obtained, the appropriate mean values from Table 11.2.3-1 may be used, but in that case, the quality ratings of the equations are reduced by one level.

TABLE 11.2.3-3. RANGES OF SOURCE CONDITIONS FOR EQUATIONS 1 AND 2<sup>a</sup>

Equation	Silt content (%)	Moisture content (%)	Dumping capacity		Drop height	
			m <sup>3</sup>	yd <sup>3</sup>	m	ft
Batch drop	1.3 - 7.3	0.25 - 0.70	2.10 - 7.6	2.75 - 10	NA	NA
Continuous drop	1.4 - 19	0.64 - 4.8	NA	NA	1.5 - 12	4.8 - 39

<sup>a</sup> NA = not applicable.

For emissions from equipment traffic (trucks, front end loaders, dozers, etc.) traveling between or on piles, it is recommended that the equations for vehicle traffic on unpaved surfaces be used (see Section 11.2.1). For vehicle travel between storage piles, the silt value(s) for the areas



among the piles (which may differ from the silt values for the stored materials) should be used.

For emissions from wind erosion of active storage piles, the following total suspended particulate (TSP) emission factor equation is recommended:

$$E = 1.9 \left( \frac{s}{1.5} \right) \left( \frac{365-p}{235} \right) \left( \frac{f}{15} \right) \text{ (kg/day/hectare)} \quad (3)$$

$$E = 1.7 \left( \frac{s}{1.5} \right) \left( \frac{365-p}{235} \right) \left( \frac{f}{15} \right) \text{ (lb/day/acre)}$$

where: E = total suspended particulate emission factor  
s = silt content of aggregate (%)  
p = number of days with  $\geq 0.25$  mm (0.01 in.) of precipitation per year  
f = percentage of time that the unobstructed wind speed exceeds 5.4 m/s (12 mph) at the mean pile height

The coefficient in Equation 3 is taken from Reference 1, based on sampling of emissions from a sand and gravel storage pile area during periods when transfer and maintenance equipment was not operating. The factor from Test Report 1, expressed in mass per unit area per day, is more reliable than the factor expressed in mass per unit mass of material placed in storage, for reasons stated in that report. Note that the coefficient has been halved to adjust for the estimate that the wind speed through the emission layer at the test site was one half of the value measured above the top of the piles. The other terms in this equation were added to correct for silt, precipitation and frequency of high winds, as discussed in Reference 2. Equation 3 is rated C for application in the sand and gravel industry and D for other industries.

Worst case emissions from storage pile areas occur under dry windy conditions. Worst case emissions from materials handling (batch and continuous drop) operations may be calculated by substituting into Equations 1 and 2 appropriate values for aggregate material moisture content and for anticipated wind speeds during the worst case averaging period, usually 24 hours. The treatment of dry conditions for vehicle traffic (Section 11.2.1) and for wind erosion (Equation 3), centering around parameter p, follows the methodology described in Section 11.2.1. Also, a separate set of nonclimatic correction parameters and source extent values corresponding to higher than normal storage pile activity may be justified for the worst case averaging period.

#### 11.2.3.4 Control Methods

Watering and chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical wetting agents for better wetting of fines and

longer retention of the moisture film. Continuous chemical treatment of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent.<sup>8</sup>

#### References for Section 11.2.3

1. C. Cowherd, Jr., et al., Development of Emission Factors for Fugitive Dust Sources, EPA-450/3-74-037, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.
2. R. Bohn, et al., Fugitive Emissions from Integrated Iron and Steel Plants, EPA-600/2-78-050, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1978.
3. C. Cowherd, Jr., et al., Iron and Steel Plant Open Dust Source Fugitive Emission Evaluation, EPA-600/2-79-103, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1979.
4. R. Bohn, Evaluation of Open Dust Sources in the Vicinity of Buffalo, New York, U. S. Environmental Protection Agency, New York, NY, March 1979.
5. C. Cowherd, Jr., and T. Cuscino, Jr., Fugitive Emissions Evaluation, Equitable Environmental Health, Inc., Elmhurst, IL, February 1977.
6. T. Cuscino, et al., Taconite Mining Fugitive Emissions Study, Minnesota Pollution Control Agency, Roseville, MN, June 1979.
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8. G. A. Jutze, et al., Investigation of Fugitive Dust Sources Emissions and Control, EPA-450/3-74-036a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.



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IN THE UNITED STATES COURT OF APPEALS  
FOR THE TENTH CIRCUIT

No. 85-2853

QUIVIRA MINING COMPANY, et al.,

Petitioners,

v.

UNITED STATES NUCLEAR REGULATORY COMMISSION  
and UNITED STATES OF AMERICA,

Respondents.

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BRIEF OF RESPONDENTS

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WILLIAM C. PARLER  
General Counsel

PETER R. STEENLAND, JR.  
Chief, Appellate Section

WILLIAM H. BRIGGS, JR.  
Solicitor

J. CAROL WILLIAMS  
Attorney  
U.S. Department of Justice  
Land & Natural Resources  
Division  
Washington, DC 20530

E. LEO SLAGGIE  
Deputy Solicitor

E. NEIL JENSEN  
Attorney  
U.S. Nuclear Regulatory  
Commission  
Washington, DC 20555

July 10, 1987

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the NRC administers "... is virtually unique in the degree to which broad responsibility is reposed in the administrative agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives." Carstens v. NRC, 742 F.2d 1546, 1551 (D.C. Cir. 1984), cert. denied, 471 U.S. 1136 (1985), quoting Siegel v. Atomic Energy Commission, 400 F.2d 778, 783 (D.C. Cir. 1968). See e.g., Duke Power Co. v. NRC, 770 F.2d 386, 390 (4th Cir. 1985); Detroit Edison Co. v. NRC, 630 F.2d 450, 453 (6th Cir. 1980); Westinghouse Electric Corp. v. NRC, 598 F.2d 759, 771 and n.47 (3d Cir. 1979).

Moreover, NRC resolutions of technical matters, such as the regulation of uranium and thorium mill tailings, is precisely the kind of technical judgment "within its area of special expertise, at the frontiers of science ... [where] a reviewing court must generally be at its most deferential." Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc., 462 U.S. 87, 103 (1983).

I. The NRC's Consideration Of The Economic Cost Of Its Program For The Management Of Mill Tailings Fully Complies With Both The 1978 UMTRCA And The 1983 UMTRCA Amendments.

The 1978 UMTRCA required the NRC to carry out its program for controlling uranium and thorium mill tailings in whatever manner the Commission "deems appropriate to protect the public health and safety and the environment." Section 205(a), UMTRCA (1978), amending Section 84a(1) of the AEA. In 1983 Congress further amended Section 84a(1) to add the requirement

that the NRC give "due consideration" to the costs of its mill tailings program:

The Commission shall insure that the management of [uranium and thorium mill tailings] is carried out in such manner as--

(...) the Commission deems appropriate ... taking into account the risk to the public health, safety, and the environment, with due consideration of the economic costs and such other factors as the Commission determines to be appropriate.

42 U.S.C. § 2114(a)(1).

Nothing in this language mentions, much less imposes a specific obligation that the Commission undertake the cost-benefit analysis which petitioners urge for each of the Appendix A criteria.<sup>10</sup> The statute speaks of the Commission insuring "the management" of mill tailings in "such manner" as it "deems appropriate" "taking into account," inter alia, "due consideration of economic costs." It is difficult to imagine a statutory charge which accords the agency more latitude on the question of how to consider costs in its regulation of a subject.

Congress explained that the new statutory language requiring the NRC to give "due consideration" to economic costs "reflect[ed] accurately the current regulatory approach of the

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<sup>10</sup>Petitioners never say exactly what their demand for a "cost-benefit analysis" entails. It seems to envision some kind of quantitative cost itemization in dollars and benefit itemization in unspecified units for every sentence in the Appendix A criteria that might impose some burden on the industry. How such an analysis might be accomplished, even in theory, for a complex rule with a great diversity of both generic and site-specific impacts, some of which actually extend thousands of years into the future, they do not begin to suggest.



agenc[y]." H.R. Conf. Rep. No. 884, 97th Cong., 2d Sess. 47 (1982). The conferees, fully aware that the NRC had already considered costs,<sup>11</sup> indicated that their choice of language was intended to speed the regulatory program to conclusion and, further, was intended "neither to divert EPA and NRC from their principal focus on protecting the public health and safety nor to require that the agencies engage in cost-benefit analysis or optimization." Id. The Conference Report thus clearly shows that Congress was satisfied that due consideration of economic factors had already been given in the 1980 NRC rulemaking, at least with respect to the criteria which did not require revision in light of the yet-to-be-promulgated EPA standards.<sup>12</sup>

In addition to the NRC's original consideration of cost in establishing the 1980 regulations, costs were also considered by EPA in promulgating the standards to which the Commission has been required to conform. Section 84a(2). In looking at the structure of Section 84(a), one notes that economic costs are mentioned only in paragraph (1). Paragraph (2), which imposes on the NRC the obligation to conform its regulations to EPA

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<sup>11</sup>The costs of nine alternative programs for the control of mill tailings were considered when the Appendix A criteria were first promulgated in 1980. See n.4, supra.

<sup>12</sup>That Congress only intended the NRC to revise those criteria which would be affected by the EPA standards is further demonstrated by (1) Congress' refusal to suspend non-affected criteria beyond December 31, 1982, Section 275f(1); and (2) Congress' tight six-month timetable for the NRC to conform its regulations to the EPA standards. Section 275f(3). See, pp. 10-12, supra.

standards, does not mention costs, reasonably enough, since EPA was directed by Section 275 of the Atomic Energy Act to "consider ... the environmental and economic costs of applying such standards." The NRC is obviously not directed by Section 84 to redo or second-guess EPA's determination that there is a reasonable relation between the costs and benefits of the burdens which its standards will impose.<sup>13</sup>

Finally costs are given "due consideration" by the Commission's regulatory scheme, which provides for costs to be taken into account at the point where the criteria are applied in site-specific licensing decisions:

All site specific licensing decisions based on the criteria in this Appendix or alternatives proposed by licensees or applicants will take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the Commission determines to be appropriate. In implementing this Appendix, the Commission will consider "practicable" and "reasonably achievable" as equivalent terms. Decisions involving these terms will take into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest.

10 C.F.R., Part 40, Appendix A, Introduction.

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<sup>13</sup>The major economic issue in uranium mill tailings control--whether the high cost of reducing the risks to health and the environment from radon emissions, toxic effluents, and potential misuse of tailings to the levels set by the EPA standards is justified--has been settled by American Mining Congress v. Thomas in favor of health and the environment. Petitioners cannot retrieve their lost case against EPA by arguing that the NRC should have re-analyzed the costs and benefits of adopting criteria to implement the EPA standards.

Section 84c of the AEA provides the Commission the authority to treat licensee-proposed alternatives to the Commission's requirements as satisfying those requirements if they provide a level of protection "which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved" by the Commission's requirements (emphasis added). The Commission's regulation quoted above gives notice that "practicable" does not mean merely "possible" but is equivalent to "reasonably achievable" and that NRC decisions regarding what is reasonably achievable will take into account, inter alia, "the economics of improvements in relation to benefits to the public health and safety."<sup>14</sup> This regulatory provision more than meets the "due consideration of economic costs" requirement of Section 84a(1).

Petitioners fault this approach because it allegedly does not consider the costs and benefits of each criterion in Appendix A. Pet. Brief at 29-36. They are entitled, they argue, not just to have cost consideration in the implementation of the criteria, but also to have the criteria themselves specifically crafted with their costs and benefits analyzed. To only consider costs in implementation of the NRC criteria, they argue,

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<sup>14</sup>This language is taken directly from the definition of "as low as is reasonably achievable" ("ALARA") which is a part of the NRC's regulations. 10 C.F.R. § 20.1(c). It shows that the Commission will interpret "practicable" within the ALARA policy of weighing the benefits of reduction in exposure to radiation against costs. See p. 18, supra.

improperly shifts the burden of making the statutorily required cost-benefit analysis from the agency to them.

Petitioners are wrong for at least two reasons that are clear from the face of the statute. First, Section 84a(1) requires the Commission to give due consideration to costs in its overall "management" of mill tailings. Nothing in this language specifies at what point costs must be considered in the Commission's management program. In particular, the statute does not say to what degree, if any, costs must be considered in drafting the specific criteria (although costs were in fact considered at that stage, see pp. 22-24 and note 4, supra). It would be fully consistent with this statutory directive to only consider costs in the implementation of the NRC's criteria. Second, and more obviously, the statute only requires "due consideration" of economic costs, not a cost-benefit analysis. Due consideration says nothing about who should bear the burden of demonstrating that a less costly, but equally effective, alternative exists to a specific criterion.<sup>15</sup> The Commission's

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<sup>15</sup>The Senate bill authorized the Commission to consider, in establishing its requirements, "alternate means for assuring adequate protection of the public health, safety and the environment." 128 Cong. Rec. S 2967 (daily ed. March 30, 1982). See pp. 10-11, supra. The bill agreed to in conference, however, put the burden on the licensee to propose site-specific alternatives which the Commission could then consider. Section 84c. Congress thus recognized that the licensee was in the best position to devise alternatives and make the initial judgment that such alternatives were equivalent, to the extent practicable, to the Commission's requirements. The petitioners' apparent notion that instead of allowing for licensee-proposed

[Footnote Continued]

regulatory provisions give each mill operator the opportunity to show that because of costs an alternative approach should be adopted for a particular site. This is a reasonable and acceptable way for NRC to include "due consideration of economic costs" in the tailings management program.<sup>16</sup>

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[Footnote Continued]

alternatives the Commission should have developed for each site an optimum tailings management program and imposed that by hard and fast rule is at odds both with practicality and with their own insistence on "flexibility" in the regulatory scheme.

<sup>16</sup> Petitioners argue that the NRC was under a duty to conduct a cost-benefit analysis and amend certain criteria unaffected by the EPA standards because the criteria presented generic problems (the requirement in Criterion 4(d) that disposal sites have a full self-sustaining vegetative or rock cover; the slope requirements of Criterion 4(c); and the designation, in Criterion 3, of below-grade disposal as the "prime option" for disposal of tailings). Pet. Brief at 33-36. The NRC did consider the costs and benefits of these criteria when it promulgated the 1980 regulations. See, e.g., n. 4, *supra*. Moreover, a simple reading of Criterion 4 shows that it envisions circumstances in which neither a vegetative nor a rock cover will be required and in which alternative slope requirements will be permitted. 10 C.F.R. Part 40, Appendix A, Criterion 4(c),(d). Nor is above-grade disposal at existing sites prohibited by Criterion 3. See p. 31, *infra*. Similarly, contrary to petitioners' argument that deletion of the word "usable" in Criterion 1 was meant to impose "a total nondegradation standard on all groundwater, regardless of usability," Pet. Brief at 28, the Commission explained that this change

was not intended to set aside the site specific option to pursue alternate concentration limits which may be based in part on the existing and potential use of the groundwater.

50 Fed. Reg. 41857. Even if these criteria do present generic problems, the agency's decision to treat these problems on a site-specific basis, which would permit the acquisition of experience on which future generic treatment could be based, is a decision well within its scientific expertise.



Petitioners also argue that this Court's analysis in American Mining Congress mandates some cost-benefit analysis that has not yet been performed by the NRC. Pet. Brief at 22. In American Mining Congress this Court considered the meaning of the statutory requirement that EPA "shall consider ... economic costs." 772 F.2d at 623, 630-32. Whatever meaning that language may have sheds little light on the NRC's statutory duty to give "due consideration" to economic cost in a manner that it deems "appropriate." Congress' call for the NRC to provide "due consideration" is not at all "nearly identical," as the petitioners would have it, Pet. Brief at 21, to Congress' peremptory direction to EPA in Section 275 that EPA "shall consider ... the ... economic costs of applying such standards." 42 U.S.C. § 2022(b)(1).<sup>17</sup> In contrast, the Commission is left

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<sup>17</sup>The conferees changed the language with respect to NRC's duty from that proposed by the Senate bill, which was similar to the language with respect to EPA's duty, to the present language, which was thought to conform more closely to NRC's actual practice. See, pp. 10-13, supra. See also the explanation provided by the Conference Chairman, Mr. Udall:

Mr. Ottinger. I note that the conference report also requires that the NRC and the EPA give due consideration to the environmental and economic costs of the mill tailings regulations. Is it your understanding that this is not intended to impose a new or different basis for the issuance of regulations or for the review of regulations previously issued?

Mr. Udall. That is my understanding. The agencies have assured the conference that such factors have been duly considered in the development of their mill tailings regulations. If such regulations are feasible, nothing in this provision would require

[Footnote Continued]



the discretion to determine what nature and amount of economic consideration is "due," when it is to be factored into the NRC's management of mill tailings, and how the NRC's regulations should accordingly be shaped.

The NRC has considered the costs and benefits of the Appendix A criteria and EPA has conducted a cost-benefit analysis of the general standards to which the 1985 revisions to the Appendix A criteria conform. The NRC will further consider costs in discharging its Section 84c mandate to consider site-specific alternatives proposed by the industry that are "equivalent to [its criteria], to the extent practicable." Congress has required--and petitioners are entitled to--no more. The NRC has complied with its statutory obligation--to give "due consideration" to economic cost in a fashion that the NRC has reasonably concluded meets the requirements of the statute. That conclusion is entitled to deference, Chevron, supra, and should be upheld by this Court.

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[Footnote Continued]

either agency to reformulate or reconsider regulations which have been issued.

128 Cong. Rec. H 8824 (daily ed. Dec. 2, 1982) (emphasis added).

II. The Commission's Approach To Regulating Mill Tailings Provides All The Flexibility That Congress Has Required.

To provide the NRC with flexibility to deal with site-specific problems, the 1983 amendments added Section 84c to the AEA. See p. 13, supra. Congress explained that the intent behind this provision was that

licensees ... be provided an opportunity to propose approaches to mill tailings containment and stabilization suited to regional or site-specific conditions which may vary from engineering or technical specifications recommended by the Commission.

H.R. Conf. Rep. No. 884, 97th Cong., 2d Sess. at 48.

To ensure that its regulations fulfilled this Congressional intent, the NRC specifically incorporated a new paragraph paraphrasing Section 84c into the Introduction to Appendix A:

Licensees or applicants may propose alternatives to the specific requirements in this Appendix. The alternative proposals may take into account local or regional conditions, including geology, topography, hydrology and meteorology. The Commission may find that the proposed alternatives meet the Commission's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by the requirements of this Appendix and the standards promulgated by the [EPA].

50 Fed. Reg. 41862. Thus, the regulations directly provide for the precise flexible mill tailings management which Congress envisioned when it added Section 84c to the Atomic Energy Act.

Incredibly, petitioners argue that the NRC regulations are so inflexible as to be unlawful. In support of this argument

petitioners advance a parade of horrors which they imagine will be wrought by the NRC's mill tailings rule. Pet. Brief at 37-40. Because such irrational, expensive, and nonsensical results would be arbitrary and capricious, petitioners assert, the NRC's rule must fail. But it is petitioners' imaginary, future misapplication arguments that must be rejected by the Court, not the NRC's rule. For those arguments all fundamentally misconstrue the NRC's regulations and the way that they operate. Moreover, and most importantly, they all ignore the fact that the rule specifically provides that petitioners may propose alternatives in the event a specific criterion cannot reasonably be applied to their specific sites.

Thus, petitioners argue that the "requirement for below-grade disposal (Criterion 3)" provides "an example of the rigidity of the criteria" because "[b]elow-grade disposal is simply impossible at some sites, regardless of expense." Pet. Brief at 37-38. The language of Criterion 3 itself makes plain that while below-grade disposal is a "prime option," it is not an inflexible "requirement." The Commission recognized that full below grade burial may be impracticable at certain sites due to various factors such as "excessive cost." In such a case, all the licensee need do is demonstrate that an above grade disposal program will provide "reasonably equivalent isolation," to the extent practicable, of the tailings. Petitioners' objections are no more than speculation that the NRC will reject such a licensee-proposed alternative. Petitioners will have the right to complain on judicial review if their alternatives are rejected

in an arbitrary and capricious manner. Cf. Westinghouse Electric Corp. v. NRC, 555 F.2d 82, 92 (3d Cir. 1977) (no need for a court to anticipate that applications of a rule in specific instances may violate statutory policy and "ample opportunity for judicial intervention" to prevent such violations).

Similarly, petitioners suggest that an alleged failure of the criteria to distinguish between new and existing sites will lead to a situation where criteria relating to siting of tailings impoundments will require "that the millions of tons of tailings at existing facilities ... be moved ... regardless of whether such a massively costly endeavor is necessary to meet the basic health, safety, and environmental goals of UMTRCA." Pet. Brief at 40. However, even petitioners are forced to acknowledge that the NRC indicated both in 1980 and in 1983 its intent to treat new and existing sites differently.<sup>18</sup> Pet. Brief at 41. Again in 1985, the NRC in responding to EPA's comment that the distinction in EPA's standard between new and existing sites was

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<sup>18</sup>When NRC published its 1980 regulations, it stated:

Regulations were developed recognizing that it may not be practicable to provide the same measures of conservation at existing sites as can be done at new sites where alternatives are not limited. ... [O]bjectives ... providing below-grade burial ... may not be met to the same degree at an existing site as at a new site.

45 Fed. Reg. 65523 (Oct. 3, 1980). In 1983, when NRC suspended some of its 1980 regulations, NRC indicated the continuing validity of this intent by stating that "siting only applies to new sites or new disposal areas." 48 Fed. Reg. 35352 (Aug. 4, 1983).

not reflected in the rule, emphasized that Criterion 5 preserved the existing/new site provisions of 40 C.F.R. Part 192. 50 Fed. Reg. 41857. In short, the NRC did not amend its regulations to explicitly make distinctions between new and existing sites because there was no need to do so: the NRC has repeatedly stated its intention to treat new and existing sites differently.

Arguments similar to those advanced by petitioners here were also made in Connecticut Light and Power Co. v. NRC, 673 F.2d 525 (D.C. Cir. 1982). In that case petitioners complained about NRC fire protection regulations which, they asserted, contained a number of standards that were costly, impractical, and unnecessary to meet in their plant specific situations. Like the regulations at issue here, the NRC's fire protection regulations "contain an additional, critical element of flexibility." Id. at 530. An exemption procedure was written into the NRC fire protection rule, which is analogous to the procedure that has been provided to petitioners here. In both that case and this one an affected regulated entity may be excused from meeting the required standard, provided that it can make the requisite showing that it merits an exemption. In the fire protection case, as here, the NRC's final decision on an exemption request is subject to judicial review.

As the Connecticut Light court observed, in language fully applicable to the instant case, "[t]he practical effect of the exemption procedure is ... to give utilities [another] alternative: if the company can prove that another method works as well as one of the [criteria] stipulated by the NRC, in light



of the identified ... hazards at its plant, it may ... employ that method." Id. at 534. Thus, the Connecticut Light court rejected arguments that a particular regulatory standard might lack a technical basis in a plant specific situation by observing that "the exemption procedure will allow power plants to show that alternative measures provide equivalent safety protection. ..." Id. at 535. As in the instant case, in the fire protection case, "[t]he exemption procedure ... indicates that the Commission did not intend to limit protective measures to the ... methods stipulated in the rule." Id. Moreover, "[w]ith the exemption procedure, power plants will be able to show that alternative ... systems protect the public safety at the same high level as the system chosen by the Commission." Id. at 537.

In short, if a petitioner shows that the Commission's criteria are impracticable for its site and points to alternatives at a more reasonable price which achieve the required level of protection to the extent practicable, the Commission's regulations will permit that alternative mill tailings control methodology rather than the specific criteria set forth in the regulation. If the Commission arbitrarily and capriciously denies a petitioner's requested alternative, administrative remedies and judicial review are available.

### III. Application Of The Appendix A Criteria To Thorium Tailings Is In Accord With The Statutory Mandate And The EPA Standards The Commission Is Required To Implement.

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The criteria of Appendix A apply not only to the management of uranium mill tailings but also to tailings produced



To the contrary, in support of Criterion 10 the Commission made a reasonable generic determination that monitoring should be conducted at all tailings disposal sites:

Disposal (of mill tailings) must be by means which reasonably assure the tailings will remain isolated under natural forces without active care and maintenance. ... The Staff considers, however, that as a supplementary measure, there should be continued monitoring and control of land uses at sites ... to confirm that there is no disruption by either natural erosion or by human-related activities. It is prudent to have such monitoring and control for as long as it can be provided by human institutions. ...

I FGEIS, Section 12.3.11 Long Term Control, pp. 12-28 (September 1980). The Commission's generic conclusion that some minimal monitoring will be necessary to confirm the continued required control of mill tailings in the future is reasonable. That conclusion adequately supports a decision to assess fees to cover the costs of such monitoring.

B. The NRC Acted Reasonably And In Accordance With UMTRCA In Determining That A Bare Promise To Self-Insure Would Not Satisfy The Surety Requirements Of UMTRCA.

Section 161x of the Atomic Energy Act, as amended by Section 203 of UMTRCA, also authorizes the Commission to establish

such standards and instructions as the Commission may deem necessary or desirable to ensure --

(1) that an adequate bond, surety, or other financial arrangement (as determined by the Commission) will be provided ... by a licensee to permit the completion of all requirements established by the Commission for the decontamination, decommissioning, and reclamation of sites, structures, and equipment used in conjunction with [uranium mill tailings]

42 U.S.C. § 2201x(1).

In Criterion 9 the Commission implemented this broad discretionary authority by requiring:

Financial surety arrangements must be established by each mill operator prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the mill and site and for the reclamation of any tailings or waste disposal areas.

10 C.F.R. Part 40, App. A, Criterion 9.

The regulation further set forth those financial surety arrangements that would be generally acceptable to the Commission:

- (a) Surety bonds;
- (b) Cash deposits;
- (c) Certificates of deposit;
- (d) Deposits of government securities;
- (e) Irrevocable letters or lines of credit; and
- (f) Combinations of the above or such other types of arrangements as may be approved by the Commission. However, self insurance, or any arrangement which essentially constitutes self insurance (e.g., a contract with a State or Federal agency), will not satisfy the surety requirement since this provides no additional assurance other than that which already exists through license requirements. (emphasis added).

Id.

The petitioner's claim that the underlined language foreclosing "self-insurance" is arbitrary and violates the statute. Pet. Brief at 46-49. To support this argument the petitioners cite examples of reliance upon self-insurance in other contexts and note the convenience, economy (for the licensee), and other asserted merits of self-insurance, which in

their view make its exclusion by Criterion 9 an arbitrary and unauthorized action.<sup>24</sup>

The answer to these arguments is plain in the language of Criterion 9, which by its terms rejects only that sort of bare promise self-insurance which "provides no additional assurance other than that which already exists through license requirements." The Commission's exclusion of such arrangements is reasonable beyond fair dispute. The exclusion is in accord with the financial surety language of Section 161x of the AEA, as added by Section 203 of UMTRCA. Indeed, there would have been no point to add the requirement with the 1978 passage of UMTRCA had Congress not intended to extend the Commission's authority and the licensee's financial obligations beyond what already existed elsewhere in the licensing provisions of the Atomic Energy Act. The licensee's bare, unsupported promise that it will perform its obligation to decommission a mill site in accordance with the conditions in its license, while convenient to administer and certainly economical for the licensee, obviously does not add the additional security contemplated by Section 203 of UMTRCA. For

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<sup>24</sup>Petitioners assert that "there is simply no evidence that self-insurance by uranium milling companies, many of which are components of large, diverse corporations, will provide a lesser level of protection than bonds issued by a surety company or letters of credit extended by a financial institution." Pet. Brief at 48. These are, of course, the same petitioners who a few pages earlier plead that "the ability of the domestic uranium industry to survive is increasingly in doubt." Pet. Brief at 17. Petitioners rely on their poverty to support one argument and their wealth to support another, all in the same brief.

the Commission to deem "necessary or desirable" something more than this in the way of surety is scarcely arbitrary or capricious.

Apart from exclusion of such a "bare promise" type of self-insurance, Criterion 9 does not limit a licensee's financial creativity in proposing surety arrangements. The six alternatives listed as "generally acceptable" to the Commission are not declared to be exclusive. Should an operator propose a surety program which might carry the name "self-insurance" but would in fact provide assurance beyond that which exists already though license requirements, Criterion 9 would not prevent the Commission from accepting that proposal.<sup>25</sup> In short, the petitioners have protested too soon. Criterion 9 mandates no such rejection, and there is no reason to anticipate that the NRC will act unreasonably in applying it. Cf. Westinghouse Electric Corp. v. NRC, 555 F.2d 82, 92 (3d Cir. 1977).

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<sup>25</sup>Petitioners argue that:

Self-insurance may be structured to provide assurance beyond mere licensing requirements through the establishment of net-worth, cash-flow, or other detailed financial qualifications and the requirement that these qualifications be substantiated by the filing of financial data at regular intervals. In fact, the NRC's own financial protection regulations for nuclear reactors are structured in exactly this fashion.

Pet. Brief at 48. The answer to this is simply that a self-insurance plan so structured as to provide assurance beyond licensing requirements is not a "bare promise" self-insurance and will be considered by the NRC.



# Clark County Board opposes nuke waste site

MARSHALL, Ill. (AP) — The county board voted 4-3 Friday to oppose location of a low-level nuclear-waste disposal facility in the Clark County — the state's top choice for the site.

People packed the courtroom and stood in the halls as board members listened to arguments for and against having the facility in Clark County.

"To vote on it today would be de-

nying us time to learn," said board member David Schiver, who wanted to postpone action.

The board voted to oppose the nuclear-waste site after hearing arguments and receiving petitions signed by 3,733 people who do not want the facility in the county.

"When someone tries to go against the voice of the people, whether it be the state or a few board members, they will lose,"

said Bill Wieck of Marshall, an opponent of the project.

State Nuclear Safety Director Terry Lash, who attended the meeting and is overseeing selection, said he thought a vocal minority had imposed its will on the majority.

Federal law requires development of a low-level nuclear waste disposal site in the Illinois-Kentucky region by 1993. The facility is

to be built in Illinois because nearly all the waste is generated here.

The facility still could be built in Clark County if officials in the town of Martinsville want it and a suitable site is available, said Nuclear Safety Department spokesman Bruce Rodman.

The state was considering Clark, Marshall and DeWitt counties for the facility, but had indicated that Clark County was its first choice.



## Clark County, Ill., Says No To Radioactive Waste Dump

By Phil Luciano

MARSHALL, Ill. — The Clark County Board voted Friday to reject a state proposal for a low-level radioactive waste repository within its borders.

The 4-3 vote was followed by thunderous applause from more than 300 residents who overflowed the county courtroom in Marshall. Some carried signs saying, "Dump the Dump."

The vote leaves Marshall County, north of Peoria, and Dewitt County, north of Decatur, as the only geologically suitable waste sites in the state whose residents have not told the Illinois Department of Nuclear Safety to look elsewhere.

Clark County, about 200 miles east of St. Louis on the Indiana border, had been among 17 counties identified by the department as suitable hosts for the waste site.

Martinsville, a small community in Clark County, voted Thursday to urge the county board to accept the nuclear dump because it would bring jobs to the area.

But supporters of the waste repository were outnumbered at the board meeting Friday.

Bill Whieck, a teacher at Marshall High School in Clark County, presented the board with petitions bearing the signatures of 3,700 county resi-

dents opposed to the dump.

And Estel Whitaker of Marshall said he feared that the state would use the low-level waste repository to dispose of more dangerous high-level waste.

"Their guarantee isn't worth a snowball in hell," Whitaker said, to cheers from the crowd.

Board Chairman John Hammond and two of his colleagues had urged that the county, plagued by 9 percent unemployment and a stagnant economy, study the issue more before taking a vote.

He and other supporters of the repository argued unsuccessfully that it would provide jobs and revenue to the area.

"I guess we go ahead and die a little bit more, but I guess that's what some of them want," Hammond said.

State officials have said the waste site will provide 100 jobs and \$1 million annually to the economy of the county in which it is located.

Terry Lash, director of the Department of Nuclear Safety, said the agency would now focus its attention on Marshall County.

The Marshall County Board has voted twice to continue studies on becoming the site. The Dewitt County Board has defeated both negative and positive resolutions to become the site but is believed to be opposed.

ST. LOUIS POST DISPATCH

1/23/88

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# Nuke dump is Marshall's for the asking

By BARNABY DINGES  
of the Journal Star

Marshall County is the sole remaining candidate for the state's low-level radioactive waste facility, at least until the County Board votes on the issue.

Clark County, which had the most potential sites among three final contenders, voted Friday against hosting the waste facility. The DeWitt **WOODFORD OPPOSED A12** County Board pulled out of the waste disposal derby Wednesday.

Bruce Rodman, legislative liaison for the Illinois Department of Nuclear Safety, called the Clark County vote "a disappointment."

"Many people in Clark County were informed about the facility and we thought we could work to address specific concerns," he said. "We will now set our sights on Marshall County and see if we can drum up more support in the coming days."

The Marshall County Board is scheduled to vote Feb. 4 on the matter.

In an informal poll of board members Friday by the Journal Star, members Lonna J. Nauman, Sharon DeWeerth and Tom Wenk opposed the facility. Nauman said she made a motion at the last board meeting to withdraw Marshall County from being considered as a potential

Please see DUMP, Page A3

# DUMP

## Continued from Page A1

site. "The risks outweigh the benefits," she said.

Wenk said the board has examined the issue and he feels obligated to follow the wishes of his constituents. "The preponderance of the people that are contacting me are telling me they are against it."

Board member Dean Deffenbaugh said he would vote against it at this point. "First comes the safety of the people where you live. The only reason we gave it a second thought was because of the money involved," he said.

Deffenbaugh said about 80 percent of the letters he has received express opposition to the facility.

Four board members — John Kasky, Eldon Folkerts, Russell Helander and David Gill — said they were undecided on the issue. "Quite frankly, the sentiment in Marshall County is going 8 or 9 to 1 to not having the waste site here," Kasky said.

Marshall County Board Chairman Andrew Placher would not reveal his stand on the issue, saying, "I think we'll wait until Feb. 4 and see how everybody votes then." Placher earlier said a majority of the 12-member board opposes the waste facility.

The three other Marshall County Board members could not be reached for comment Friday night.

The Clark County Board voted 4-3 against hosting the federally mandated storage facility. "It was a very emotional situation," said County Clerk Les Litteral.

Petitions bearing the signatures of 3,200 opponents of the plan were presented to Clark County Board

members, who moved their meeting to a large room at the county courthouse to accommodate an overflow crowd of several hundred.

"When someone tries to go against the voice of the people, whether it be the state or a few board members, they will lose," said Bill Wieck of the town of Marshall in Clark County.

Board member David Schiver asked to postpone action Friday, saying, "To vote on it today would be denying us time to learn." But board member Don Guinnip successfully argued an immediate vote was needed to give the public some direction.

State Nuclear Safety Director Terry Lash, who attended the meeting and is overseeing site selection, said he thought a vocal minority had imposed its will on the majority.

The facility still could be built in Clark County if officials in the town of Martinsville want it and a suitable site is available, said DNS spokesman Rodman.

DNS representatives have been trying to attract a county to volunteer for the \$30 million facility, citing its 100 jobs that carry an annual payroll of \$1 million.

The host county also is expected to benefit from about \$1 million in revenues from surcharges imposed on materials deposited at the site.

Although the department has until 1989 to locate the disposal facility, Rodman said at least three potential sites need to be selected by the spring because detailed studies of those areas will take 18 months to complete.

"We've never been in this position before," he said. "The disposal of radioactive waste has traditionally been a federal responsibility."

# Locals protest nuke waste site

The Associated Press

LACON — State officials have received an icy reception from Marshall County residents who don't want radioactive "hot" stuff buried in their area.

Hundreds of residents showed up at Lacon City Hall last week voicing opposition to placing a waste depository in their county.

The 2½-hour meeting, sponsored by the Marshall County Board, came only a week before the board is set to vote on whether to allow the state to build the low-level radioactive waste facility on a six-square-mile area north of Washburn.

"We want to impose a benefit for the host community," said Thomas Kerr of the Illinois Department of Nuclear Safety.

**KERR SAID** the storage facility would be an economic boon to the county's 14,400 residents, bringing more than 100 construction jobs and 100 permanent jobs, almost all of which would go to residents of the county.

Marshall County Board members, faced with an anticipated \$30,000 budget shortfall this year, postponed their vote on the matter until this Thursday.

State officials said the facility would bring an annual payroll of \$1 million and another \$1 million for the county in tax surcharges from waste deposited at the facility.

State officials, facing a federal deadline to get the plant operating by 1993, have said they must select a site by 1989. They hope to get the Marshall County Board's approval for the project. Officials in all the other counties with sites deemed suitable have voted against it.

**"WE'LL BE** stuck with the risk and the big power compa-

nies will have found a cheap way to get rid of their radioactive waste problem," said Jim Portscheller, who lives two miles west of Sparland.

The crowd's distrust of the state's ability to fulfill its promises was evident in an enthusiastic reception for three speakers from Sheffield, who discussed problems they face with U.S. Ecology's radioactive waste landfill in Bureau County.

"Our area is known for its nuclear dump and you can fall victim to the same thing," said Jay Langford, a Sheffield pharmacist.

A number of speakers voiced concern about the possibility of radioactive materials leaking from the storage facility and contaminating groundwater.

"We should not so much be speaking in terms of if the facility will leak, but when will it leak," said Patrick Sloan, an opponent of the proposed facility.

**SLOAN AND** other opponents said they polled 3,518 area residents over the last two weeks and found 97 percent opposed building the facility in Marshall County.

Kerr returned Thursday from Barnwell, S.C., where he took two Marshall County Board members and two opponents of the storage facility on a tour of a low-level radioactive waste facility there.

Those four agreed the South Carolina facility appeared to be safe and well-run, but they did not return as enthusiastic supporters of the plan.

Board members Dale Richard and Eldon Folkerts said they remain undecided on how they will vote on the issue.

Bob Sloan of Henry, an opponent of the proposal, said the trip did not relieve his anxieties.

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D Chicago Tribune, Wednesday, February 3, 1988 Section 2 9

# No takers for state's nuclear dump

By Chad Carlton  
Chicago Tribune

SPRINGFIELD—All Terry Lash needs are 4 of the 55,748 square miles in Illinois.

It's what the director of the state Department of Nuclear Safety seeks the land for—storing the equivalent of 50 football fields 5 feet deep in radioactive garbage—that's making it hard to come by.

Department officials have been looking for a technically excellent and politically acceptable site for a low-level nuclear waste disposal facility the state must build.

They've found plenty of suitable land scattered throughout 17 counties. But the department has thus far failed the political test. All of the counties but one—Marshall—have told Lash to count them out.

"Nobody wants a dump," said Edward Alpen, a nuclear researcher at the University of California at Berkeley. "Whether it's a nuclear dump or old potatoes, they don't want it."

In the Downstate communities considered for the site, residents might not know much about nuclear waste, nuclear energy or nuclear anything. But what they do know about it is enough to convince many they don't want the facility.

"Our difficulty has been that as soon as somebody understands that their county is a possible site, the opposition mounts quickly," Lash said. "We've had a hard time communicating."

Part of the communication problem centers on the fact that low-level waste is defined by what it isn't, rather than what it is, he said.



It isn't high-level radioactive waste, such as used fuel rods from nuclear reactors and leftovers from nuclear-weapon making, said Octave Du Temple, executive director of the American Nuclear Society in La Grange Park.

High-level wastes have much greater concentrations of radioactivity than low level wastes, he said.

"If you put a shot of whiskey in a big glass of Coke, that would be low-level," Du Temple said. "If you take that same glass and fill it all up with whiskey and add a couple of drops of Coke, then you have a high-level concentration."

Low-level wastes can be anything from test tubes used in nuclear lab experiments to some radioactive plumbing from a nuclear reactor, said John Cooper, a spokesman for

the Nuclear Safety Department. But more than half of the 250,000 cubic feet of waste Illinois produces annually is just contaminated trash, Cooper said.

It's things like caps, gloves, coveralls and goggles worn by reactor crews to clean up water leaks or check radioactive portions of the station. It also includes towels and mops used to absorb the water, he said.

The largest producers of low-level waste are the 13 power-producing nuclear reactors. They account for about 80 percent of the waste by volume produced in Illinois. About 50 other producers, including dozens of hospitals, university labs and a few companies, account for the remaining volume.

Illinois leads the nation in number of reactors and volume of low-level radioactive waste produced.

Illinois and Kentucky, a state with no reactors and little waste, formed the Central Midwest Compact in response to a federal mandate. States must form alliances and build disposals for their waste by 1993 or face federal fines.

Lash and other department officials have been trying to convince people that the disposal facility won't expose them to radiation and health risks.

And at the same time, they've tried to sell the site as an economic opportunity offering \$1 million annually in user fees to the host county and creating up to 100 local jobs at the facility.

But Lash said the incentives are no substitute for peace of mind.

"I don't think any amount of

money is going to change people's minds if they feel it's unsafe," Lash said.

The site will be safe, as long as it is properly constructed and maintained, said Alpen, a nationally recognized expert on radiation.

"The doses you are getting from natural exposure are far greater than what you could possibly get from one of these sites," he said. "Any extra radiation you would get would be trivial."

The facility won't be a shallow landfill, like the ones at Sheffield, Ill., and Barnwell, S.C., which have both leaked into groundwater, Lash said. The contractor the state selects for the site will choose from several modern concrete-reinforced designs, which will include leak monitoring devices, Lash said.

Recently, most of the department's focus has been on Clark County, whose board two weeks ago rejected the facility on a 4-3 vote.

The concentration has continued even after the vote, Lash said, because many residents still support the site. Department officials have narrowed their focus to Martinsville, a town of 1,300 in the center of the county, whose council has voted for continued study.

The department is also trying to build support in Marshall County in the north central part of the state, where a vote on rejecting the facility is scheduled for Thursday.

If no county or town can be found that will accept the site, Lash said the General Assembly will probably have to pick an unwilling county.

"I really hope it doesn't come to that," Lash said.

AURORA, ILLINOIS

4 BEACON-NEWS, Sunday, February 21, 1988—Sect. A

# Selling nuclear waste disposal site not an easy job

By Matt Krasnowski  
Copley News Service

SPRINGFIELD — The dangers of nuclear waste are not taught in grade school.

If they were, Terry R. Lash's job might be a lot easier.

Lash is the director of the Illinois Department of Nuclear Safety. His main priority for the past year has been siting a place to dispose of the state's low-level nuclear waste.

In the process, his department has become the center of controversy and the object of distrust for scores of communities.

Lash has had to sell the federally mandated nuclear waste disposal facility to several central Illinois counties. So far, only one community has taken the hook. And that town may not get it.

Illinois is required to have the waste facility in the operation by 1983. The facility will be used to store radioactive material such as protective gowns and tools used at nuclear power plants and with X-ray systems. No spent nuclear fuel will be stored.

Illinois' site also will house Kentucky's waste, under an agreement reached with that state. Illinois produces more than 90 percent of the waste that will be stored. The site will be officially selected late next year.

As expected, the immediate reaction of most communities to this proposal has been, "Not in my back yard!"

And Lash has had to tell people that the facility will be safe, will not store high-level radioactive material and will bring jobs in the county.

It has not been the most fun part of his job.

"Obviously, there has been times



Terry R. Lash

when ... I wish I didn't have to deal with it," he said.

The issue's unpleasantness mostly comes from combating ignorance about the waste.

Some people say the way the siting process has been handled has contributed to those problems.

This process begins, typically, with Lash being invited into counties by local business leaders who are interested in the facility. Local media find out and report it. Some vocal citizens become outraged. Then the county board votes against having the disposal facility there.

Legislators who have dealt with Lash say he has brought on himself much of the criticism he has received.

"He's been so open and up front with some things, he just adds fuel to the fire," state Rep. Mike Weaver, R-Charleston, said. "Al-



most everything he's done has been out in the public."

Another legislator, who did not want to be identified, said Lash's problems stem from bureaucratic double-talk.

Lash has said the state will not site the low-level waste facility in a county that doesn't want it. But the department has continued looking at some counties after locals said no.

"That just gives the impression of mistrust," the legislator said.

For example, Clark County, the state's preferred site, has said no. But Martinsville, a town in that county, has said yes. If the town meets the siting criteria, Martinsville may get the site.

Lash said his position has not changed.

"My commitment to not site in a county where the county board has jurisdiction still holds," he said.

So, if a city such as Martinsville has property over which Clark County has no authority, the disposal facility may go there.

"I never made a commitment not to study a county," Lash said. "If we get frozen out of every county ... that has very serious implications for the state."

"It's impossible for any county board at this time, in my opinion, to come to any thoughtful conclusion. Some of these boards have voted without even one presentation by us. They're reacting to the immediate emotional reactions of a significant but very vocal minority in their county. I wouldn't be doing my job if I allowed that to undercut the state's own program."

It is this state-local interaction, that makes Lash spout out statements like, "Politics is wonderful," with a bit of sarcasm in his voice.

Actually, compared to many members of Gov. James Thompson's administration, Lash is a political neophyte. He is a scholar, has written several publications on radioactive waste and has been on several commissions on the subject. He has a Ph.D. in molecular biology from Yale University.

Lash came to the state department in 1963 after working for various science and environmental think tanks. He became department director in 1964.

"I've not been an active partisan politician," he said. "I have not been the campaign manager or fi-

nance chairman or statewide anything for any candidates."

Partisan politics has not been a factor in his office, he said. "I have supporters and critics on both sides of the aisle," he said.

A politician's touch may have helped him with the low-level waste facility issue, though. Especially when he's trying to explain that the facility will be safe.

But no matter how much he explains the safety of the facility, he doesn't always get his point across.

"There are a lot of people who

just don't want to listen," Lash said. "These are difficult topics to explain. People don't learn about radiation or radioactive materials at school or deal with them at their workplace."

If all of Lash's talk gives the impression that he is a bureaucrat with little concern about people's feelings or the environment, he says think again. He is a member of the Sierra Club and the Illinois Environmental Council.

"I still consider myself a strong environmental advocate. I feel very

strongly about environmental protection. I'm not going to compromise on health and safety," he said.

And if he had to do it over again, would he still be with the think tanks?

"I've always been interested in working for the government in public policy," he said. "I'm not surprised I'm in this position. I've wanted to be in this kind of position."

But, then again, he jokes, the complaints he could do without.



DRAFT

# REGIONAL MANAGEMENT PLAN

Prepared by

The Central Midwest Interstate  
Low-Level Radioactive  
Waste Compact

1035 Outer Park Drive  
Springfield, Illinois 62704  
(217) 785-9937

DRAFT

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reactors immediately after they are shut down. Immediate decontamination and dismantling of the 14 reactors in the Compact region (one reactor is currently already shut down but will have to be decontaminated eventually) could yield about 8 million cubic feet of waste containing about 2.6 million curies of activity. The volumes indicated in Figure 2-4 are based on the assumption that the reactors will be shut down 40 years after first receiving their full power license. The two peaks result from the fact that almost all the reactors in the Compact began operating in two distinct time periods.

If a different reactor decommissioning option is used -- one that "mothballs" the reactors for 50 years following shutdown to allow much of the radioactivity to decay before dismantlement -- the radioactivity and volume of the radioactive wastes produced would be lowered considerably. Figure 2-4 also shows a projection of volumes of waste reaching the disposal facility under this alternative plan for decommissioning reactors. The delayed dismantlement approach reduces the volume of waste entering the disposal facility by about 90 percent and the radioactivity by about 75 percent.

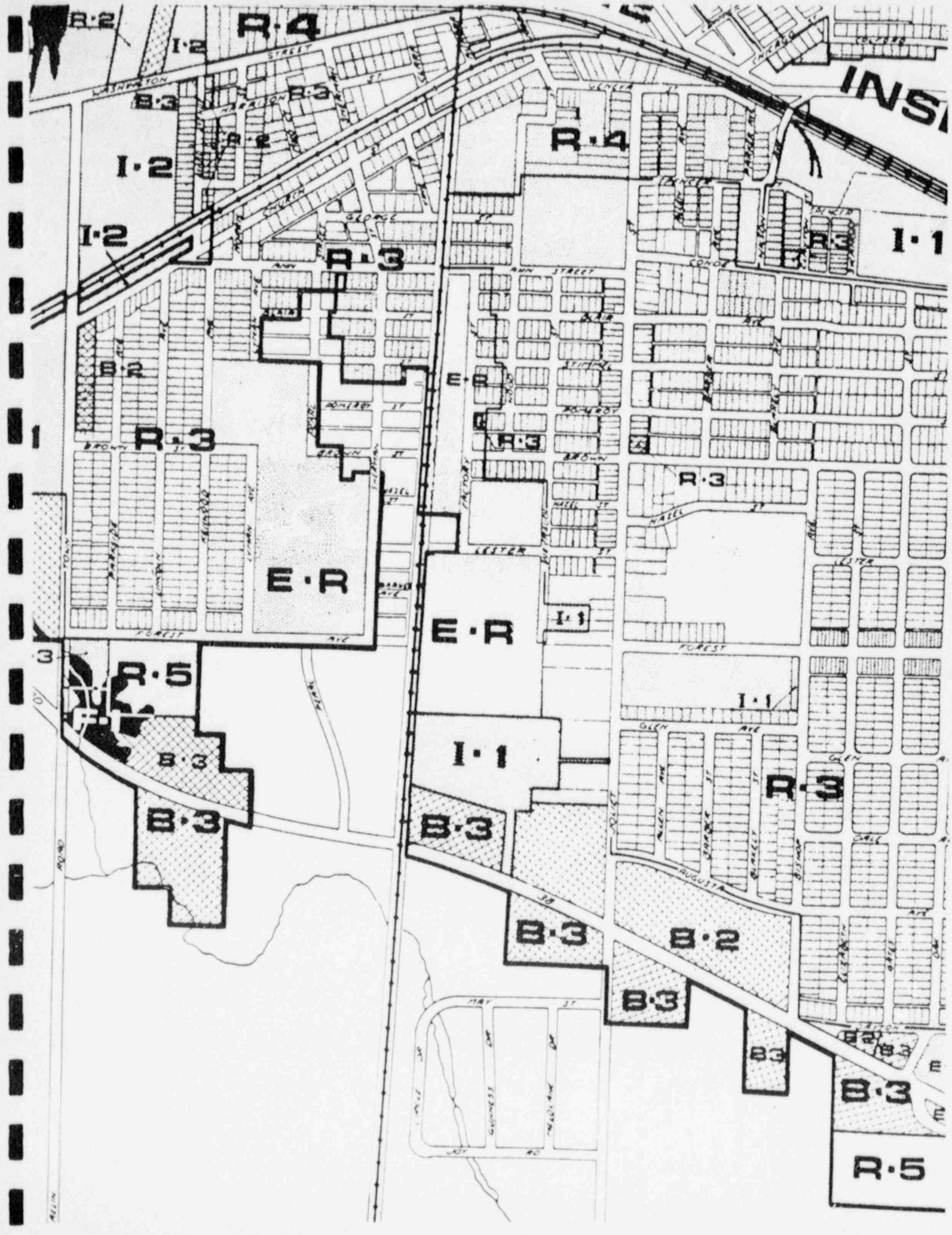
It is therefore clear that one of the major opportunities for reducing volume and radioactivity of waste entering the Compact's disposal facility is the temporary storage of reactors before they are dismantled.

Nonreactor Facility Decommissioning - Estimates of low-level radioactive wastes from decommissioning nonreactor facilities (and small non-utility reactors) were difficult to develop. Two decontamination projects at Ottawa, Illinois, and Elgin, Illinois produced about 14,000 ft<sup>3</sup> of LLW in 1986. Large existing facilities that deal with radioactive materials, such as Allied Chemical in Metropolis, Illinois, and General Electric in Morris, Illinois, could not provide estimates of decommissioning wastes. One estimate for the Morris facility is 10,000 ft<sup>3</sup> (RAE82).

The inactive Kerr-McGee facility in West Chicago, Illinois, could ship around 10 million ft<sup>3</sup> of contaminated material some day (NRC83, CH86), but this material does not fit the definition of LLW and will not have to be accommodated in the regional disposal facility.







# ZONING ORDINANCE

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## CITY OF WEST CHICAGO, ILLINOIS

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This pamphlet is a reprint of Appendix A, Zoning Ordinance, of the Code of Ordinances of the City of West Chicago, Illinois, published by order of the City Council.

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MUNICIPAL CODE CORPORATION

Tallahassee, Florida

Reprinted 1987

(B) *Building or structure designed or intended for a permitted use.* The nonconforming use of part of a building or structure all or substantially all of which building or structure is designed or intended for a use permitted in the district in which it is located, shall not be expanded or extend into any other portion of such building or structure nor changed to any other nonconforming use.

(C) *Land.* The nonconforming use of land, not involving a building or structure, or in connection with any building or structure incidental or accessory to the principal use of the land, shall not be expanded, or extended beyond the area it occupies.

#### 5.9. Change of nonconforming use.

*Building or structure designed or intended for a nonconforming use.* The nonconforming use of a building or structure, substantially all of which is designed or intended for a use not permitted in the district in which it is located, may be changed to a use allowed in said district.

### ARTICLE VI. RESIDENCE DISTRICTS

#### 6.1. E-R estate district.

##### 6.1-1. Permitted uses.

- (A) Single-family detached dwelling.
- (B) Church, chapels, temples, synagogues.
- (C) Convent, monastery and religious retreats.
- (D) Country club.
- (E) Golf courses, but not golf driving ranges, pitch and putt, miniature golf courses or par-3 golf courses.
- (F) Parks, playgrounds and forest preserves.
- (G) Public library.
- (H) Public open land, refuge or preserve.
- (I) Noncommercial recreational buildings and community centers.
- (J) Public or private schools, elementary, high, junior college or university. Private schools shall have a curriculum substantially identical to that ordinarily given in a public elementary or high school, and have no rooms regularly used for housing or sleeping purposes.
- (K) Permitted home occupations, including, but not limited to those permitted home occupations contained in section 3.18(b) of Appendix A, Zoning. (Ord. No. 1618, § 3, 11-15-82)

6.1-2. *Accessory uses.* As permitted in accordance with Article III, section 3.16.

6.1-3. *Special uses.*

(A) Planned developments.

(B) Cemeteries.

(C) Cultural facilities.

(D) Health facilities.

(E) Public buildings and facilities.

(F) Day care centers, which do not meet the requirements of a home occupation as specified in section 3.18(b) of Appendix A, Zoning. (Ord. No. 1618, § 4, 11-15-82)

6.1-4. *Lot size requirements.* With the exception of planned residential developments, a separate ground area herein called the zoning lot, shall be designated, provided and continuously maintained for each structure containing a permitted or special use, as follows:

(A) <i>Permitted Uses</i>	<i>Minimum Lot Area (square feet)</i>	<i>Minimum Lot Width (feet)</i>
Single-family dwelling	40,000	150
Recreational and social buildings	60,000	150
Religious institutions	80,000	150
Schools	30,000	125

All other permitted uses shall be located on a lot having an area of not less than one hundred thousand (100,000) square feet with a minimum width of two hundred (200) feet at the established building line.

(B) <i>Special Uses</i>	<i>Minimum Lot Area</i>	<i>Minimum Lot Width (feet)</i>
Planned developments	40 acres	750 feet
Cemeteries	10 acres	200 feet
Cultural facilities	80,000 sq. ft.	150 feet
Health facilities	80,000 sq. ft.	150 feet

Public services and utilities as specified by the plan commission.

6.1-5. *Yard requirements.*

(A) *Minimum front yards:*

(1) Single-family dwelling: Forty (40) feet.

(2) All other permitted or special uses: Fifty (50) feet.

(B) Minimum corner side yard:

- (1) Single-family dwelling: Thirty-five (35) feet.
- (2) Schools: Fifty (50) feet.
- (3) All other permitted and special uses: Thirty-five (35) feet.



## (C) Minimum side yard:

- (1) Single-family dwelling: Twenty-five (25) feet.
- (2) Schools: Fifty (50) feet.
- (3) All other permitted or special uses: Twenty (20) feet.

## (D) Minimum rear yard:

- (1) Single-family dwelling: Forty (40) feet.
- (2) Schools: Eighty (80) feet.
- (3) All other permitted or special uses: Fifty (50) feet.

*6.1-6. Bulk regulations.*

(A) Maximum structure height: No building shall exceed two and one-half (2½) stories or thirty (30) feet in height, whichever is less.

## (B) Maximum lot coverage:

- (1) Single-family dwelling: Twenty (20) per cent.
- (2) Planned development, residential: As specified by plan commission.
- (3) All other permitted or special uses: Thirty (30) per cent.

*6.1-7. Dwelling standards.*

(A) One-story dwellings shall have a total ground floor area of not less than one thousand four hundred (1,400) square feet measured from the outside of the exterior walls, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other spaces whose use is not principally for living, eating or sleeping purposes.

(B) Dwellings of more than one story shall have a total floor area measured from the outside of the exterior walls, of not less than one thousand six hundred (1,600) square feet, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other spaces that are not used frequently or during extended periods for living, eating or sleeping purposes, except that enclosed space intended for habitable rooms which are to be completed within a reasonable time may be considered in computing such floor areas.

*6.1-8. Signs.* Signs shall be subject to the regulations contained in Article X.

*6.1-9. Off-street parking and loading requirements.* Off-street parking and loading facilities shall be provided as required in Article XI.

**6.2. R-1 single-family residence district.**

*6.2-1. Permitted uses.* Any use permitted in the E-R estate residence district.

*6.2-2. Accessory uses.* Those permitted in accordance with Article III, section 3.16.



# RABCOM CODE OUTPUT

## WEST CHICAGO CASE 1,7 LAYERS

### \*\*\*\*\* INPUT PARAMETERS \*\*\*\*\*

NUMBER OF LAYERS : 7  
 RADON FLUX INTO LAYER 1 : 0.000 pCi/M<sup>2</sup>/sec  
 SURFACE RADON CONCENTRATION: 0.000 pCi/L  
 BARE FLUX (J<sub>0</sub>) FROM LAYER 1 : 26.82 pCi/M<sup>2</sup>/sec

LAYER	THICKNESS (cm)	DIFF COEFF (cm <sup>2</sup> /sec)	POROSITY	SOURCE (pCi/cm <sup>3</sup> /sec)	MOISTURE (DRY WT%)
1	690.	9.6900E-03	0.3500	1.1280E-04	10.00
2	61.	3.1500E-02	0.6000	1.5040E-03	19.00
3	60.	8.7400E-04	0.3300	0.0000E+00	15.00
4	30.	1.9400E-02	0.2900	0.0000E+00	5.00
5	30.	4.3300E-03	0.3800	0.0000E+00	14.00
6	60.	4.3300E-03	0.3800	0.0000E+00	14.00
7	60.	2.0800E-02	0.5000	0.0000E+00	14.00

### \*\*\*\*\* RESULTS OF CALCULATIONS \*\*\*\*\*

LAYER	THICKNESS (cm)	EXIT FLUX (pCi/M <sup>2</sup> /sec)	EXIT CONC. (pCi/L)	MIC
1	690.	-1.6087E+02	3.7599E+05	0.6289
2	61.	3.4701E+01	4.6647E+05	0.7469
3	60.	3.0809E+00	4.0827E+03	0.3915
4	30.	1.7695E+00	6.5946E+03	0.7554
5	30.	9.4933E-01	2.3535E+03	0.5436
6	60.	4.2132E-01	1.6404E+02	0.5436
7	60.	3.5486E-01	0.0000E+00	0.7203

A) West Chicago Nominal Case  
 (See Table 12.1 of Engineering Report)

## WEST CHICAGO CASE 1,6 LAYERS

### \*\*\*\*\* INPUT PARAMETERS \*\*\*\*\*

NUMBER OF LAYERS : 6  
 RADON FLUX INTO LAYER 1 : 0.000 pCi/M<sup>2</sup>/sec  
 SURFACE RADON CONCENTRATION: 0.000 pCi/L  
 BARE FLUX (J<sub>0</sub>) FROM LAYER 1 : 26.82 pCi/M<sup>2</sup>/sec

LAYER	THICKNESS (cm)	DIFF COEFF (cm <sup>2</sup> /sec)	POROSITY	SOURCE (pCi/cm <sup>3</sup> /sec)	MOISTURE (DRY WT%)
1	690.	9.6900E-03	0.3500	1.1280E-04	10.00
2	61.	3.1500E-02	0.6000	1.5040E-03	19.00
3	60.	8.7400E-04	0.3300	0.0000E+00	15.00
4	30.	1.9400E-02	0.2900	0.0000E+00	5.00
5	30.	4.3300E-03	0.3800	0.0000E+00	14.00
6	60.	4.3300E-03	0.3800	0.0000E+00	14.00

### \*\*\*\*\* RESULTS OF CALCULATIONS \*\*\*\*\*

LAYER	THICKNESS (cm)	EXIT FLUX (pCi/M <sup>2</sup> /sec)	EXIT CONC. (pCi/L)	MIC
1	690.	-1.6087E+02	3.7599E+05	0.6289
2	61.	3.4701E+01	4.6647E+05	0.7469
3	60.	3.0831E+00	4.0672E+03	0.3915
4	30.	1.7773E+00	6.5620E+03	0.7554
5	30.	9.6502E-01	2.3093E+03	0.5436
6	60.	4.806RE-01	0.0000E+00	0.5436

B) Nominal Case minus 60cm topsoil layer.

TABLE 1 - continued

## RAECOM CODE OUTPUT

WEST CHICAGO CASE 1 5 LAYERS

## \*\*\*\*\* INPUT PARAMETERS \*\*\*\*\*

NUMBER OF LAYERS : 5  
 RADON FLUX INTO LAYER 1 : 0.000 pCi/M<sup>2</sup>/sec  
 SURFACE RADON CONCENTRATION: 0.000 pCi/L  
 BARE FLUX (J<sub>0</sub>) FROM LAYER 1 : 26.82 pCi/M<sup>2</sup>/sec

LAYER	THICKNESS (cm)	DIFF COEFF (cm <sup>2</sup> /sec)	POROSITY	SOURCE (pCi/cm <sup>3</sup> /sec)	MOISTURE (DRY WT%)
1	690.	9.6900E-03	0.3500	1.1280E-04	10.00
2	61.	3.1500E-02	0.6000	1.5040E-03	19.00
3	60.	8.7400E-04	0.3300	0.0000E+00	15.00
4	30.	1.9400E-02	0.2900	0.0000E+00	5.00
5	30.	4.3300E-03	0.3800	0.0000E+00	14.00

## \*\*\*\*\* RESULTS OF CALCULATIONS \*\*\*\*\*

LAYER	THICKNESS (cm)	EXIT FLUX (pCi/M <sup>2</sup> /sec)	EXIT CONC. (pCi/L)	MIC
1	690.	-1.6087E+02	3.7598E+05	0.6289
2	61.	3.4712E+01	4.6646E+05	0.7469
3	60.	3.1983E+00	3.2563E+03	0.3915
4	30.	2.1887E+00	4.8583E+03	0.7554
5	30.	1.7848E+00	0.0000E+00	0.5436

C) NOMINAL CASE minus 60 cm topsoil and minus 60 cm cobble.



# Rennels: Actions are for the city's good

By Brian Kulpin

Saying his interest is "solely for the good of the City of West Chicago," Mayor A. Eugene Rennels vowed to continue his crusade to keep city property on the tax rolls during his State of the City speech Monday night.

Rennels blasted the county and the state on land-grabbing plans, tearing into proposals by the county Forest Preserve Commission, the county board and the U.S. Department of Energy that, if combined, would remove 6,500 acres from the city tax rolls and \$24.12 million per year in 1987 dollars, according to his figures.

The mayor characterized the Forest Preserve, which announced plans to purchase approximately 1,000 acres of land north of the city and west of Rte. 59, as "the most dangerous land grabber of them all."

Rennels depicted Forest Preserve Commission president Charles Vaughn saying, "We've got a \$100 million, burning a hole in our pocket and right, wrong or indifferent, I'm going to see that it is spent, baby."

Forest Preserve land grabbing in West Chicago's Facilitated Planning Area would remove nearly \$14 million per year from the city if the land was incorporated into the city as planned, Rennels said.

The mayor emphasized he was taking "editorial license," with his figures. "You can play with these numbers any way you want to and it still comes up to a loss in revenue to the city which equates to an increase in cost to the resident," he said.

Rennels' second target was the county's preliminary proposal for a landfill in West Chicago. Landfills have the potential to remove more than 1,531 acres from the city and cost West Chicago \$5.68 million a year, the mayor said. "The only gain we can envision from using this land as a dump site is a

gain in truck traffic and in unemployment and empty buildings," Rennels said.

The next proposal under attack was the Superconducting Super Collider (SSC). Rennels said he is not against the SSC as mayor or as an individual, but he still blasted the state's plans.

"Where everything falls apart is the inability of the bureaucracy to deal with anything but total acceptance of their position. To them any question or statement is the same as out-

right opposition. My duty however, is to the people and the future of the City of West Chicago and if in fulfilling that duty I make it a little uncomfortable for those who believe their way is motherhood, apple pie and the flag, I apologize for making them face a real world and maybe even having to earn their living for a change."

Basing his figures on those presented by Fermilab Physicist Joseph Lach in a Letter to the Editor in the Feb. 11 issue of *The Press*,

Rennels said West Chicago would gain 22 new residents and have \$1 million spent within city limits if the SSC is built here, compared to a potential tax loss of \$3 million if the land was taken.

"That's not a major gain to good old WeGo in my book," Rennels said.

Rennels said he is also worried about the city's General Obligation bonds sold to cover the local share of the new sewer plant. Much

—Please turn to Page 21

WEST CHICAGO PRESS

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PAGE 1



## Rennels defends actions in State of the City address

—Continued from Page 1

of the land targeted is in territory marked for sewer extension that will never happen if the county gets its way, and the bonds would lose their value, the mayor said.

"I may go out and buy a bond just so I can file a lawsuit," Rennels said.

The mayor also intends to have the city contact every landowner whose property is included within any one of the listed projects for the purpose of annexation. If the city con-

trols the property they have some control over what goes on it, especially in terms of a landfill, Rennels said.

Rennels said land values are higher inside the city than just outside its borders, which should entice some landowners to annex.

County Board Chairman Jack Knuepfer will meet with Rennels this week and the mayor says he will insist that the county drastically modify its plans for West Chicago.

After giving his message, Rennels said he fears no repercussions from his comments.

"The county has always looked down on West Chicago so there will be no change in attitude now," Rennels said. "West Chicago has been referred to by the county and state leaders as the anal opening of DuPage County. Now we are going to be a force to be reckoned with."

Alderman Colin Perry said the City Council supports the Mayor fully.

"Anyone who sits at the City Council table who is not against county land grabbing doesn't belong at that table," he said.

One of the council's few actions on the night was a step toward following the mayor's plan of annexing property holders in areas threatened by county expansion. The council unanimously voted to annex a parcel on the southwest corner of Prince Crossing Road and North Avenue.

Perry said the action makes West Chicago contiguous to a parcel of property across Rte.

64 that the city has been interested in annexing.

The mayor's tirade against land grabbing overshadowed the positive accomplishments outlined in the State of the City address.

In the early portion of his speech he emphasized the gains made by West Chicago in the past year.

He cited the removal of radioactive waste from all off-factory site locations but the Reed-Keppler park site; the state's acknowledgement of jurisdiction over low-level radioactive material at Kerr-McGee; the dedication of the new wastewater treatment plant; and the near completion of the Wilson Street Bridge project.

He pointed proudly to the opening of 27 new firms locating in the city in 1987. Building permits taken out during the year showed construction and remodeling with a declared value in excess of \$13 million.