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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION '99 JAN 15 A11 :24

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Before Administrative Judge Peter B. Bloch

In the Matter of	)	
	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
(2929 Coors Road, Suite 101	)	ASLBP No. 95-706-01-ML
Albuquerque, NM 87120)	)	
	)	

EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S AND SOUTHWEST RESEARCH AND INFORMATION CENTER'S BRIEF IN OPPOSITION TO HYDRO RESOURCES, INC.'S APPLICATION FOR A MATERIALS LICENSE

WITH RESPECT TO:

HYDRO RESOURCES, INC.'S LACK OF TECHNICAL AND FINANCIAL QUALIFICATIONS

January 11, 1999

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INTRODUCTION

The Atomic Energy Act ("the AEA") and the regulations adopted by the Nuclear Regulatory Commission ("NRC") to implement the Act ("the Regulations") mandate that applicants for source materials licenses demonstrate their technical and financial qualifications to conduct the operations for which they seek licensure. The application filed by Hydro Resources, Inc. ("HRI") does not demonstrate that HRI is qualified either technically or financially to conduct the company's proposed *in situ* leach mining and milling operations in Church Rock and Crownpoint, New Mexico ("the Crownpoint Project"). Moreover, the evidence in the record of this proceeding and the public record indicate that HRI is not qualified in either manner.

Because HRI has not made this required demonstration of its qualifications, the NRC Staff ("the Staff") should not have issued License SUA-1508 to HRI, and the issuance of that License violated the AEA and the Regulations. In addition, because the NRC Staff has approved HRI's application without the demonstration of these qualifications, the Staff's action violated the National Environmental Policy Act ("NEPA") and was irrational, arbitrary, and capricious and in violation of the Administrative Procedures Act ("the APA") as well.[1]

ARGUMENT

I. THE ATOMIC ENERGY ACT AND ITS IMPLEMENTING REGULATIONS REQUIRE LICENSE APPLICANTS TO DEMONSTRATE THEIR TECHNICAL QUALIFICATIONS.

The Atomic Energy Act prohibits private persons and entities from possessing

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[1] The issues addressed in this Brief were raised by the intervenors Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") in their August 15, 1997 Second Amended Request for Hearing, Petition to Intervene, and Statement of Concerns ("Statement of Concerns"), and were admitted to this proceeding by the Presiding Officer in LBP-98-9, the May 13, 1998 Memorandum and Order (Ruling on Petitions and Areas of Concern; Granting Requests for Hearing; Scheduling).

ENDAUM and SRIC raised the issue of HRI's lack of technical qualifications on pages 102-105 of their Statement of Concerns, and that issue was admitted on page 31 of LBP-98-9. ENDAUM and SRIC raised HRI's lack of financial qualifications at pages 46-47 and 73-74 of their Statement of Concerns. That issue was admitted on page 29 of LBP-98-9. Although ENDAUM and SRIC raised the financial qualifications issue in their Statement of Concern on ground water issues, they are addressing it in this brief on HRI's lack of qualifications.

nuclear material without a license from the NRC. 42 U.S.C. § 2111. The Act also provides that the NRC may not issue a license for possession of such nuclear materials unless the NRC first determines that issuance of the license will not be inimical to the public health and safety. 42 U.S.C. § 2099.

Pursuant to this mandate, the NRC Regulations prohibit the ownership, use, and possession of source material without a license issued by the NRC. 10 C.F.R. §§ 40.2, 40.3. Those regulations also provide that before issuing a source materials license the NRC must determine that the applicant for the license is:

> qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property ....

10 C.F.R. § 40.32(b).

Finally, as on other issues, the applicant for the license has the burden of demonstrating that this requirement has been met. 10 C.F.R. §§ 2.732, 2.1237.

II. THE NRC SHOULD CONSIDER THE RECORDS OF URANIUM RESOURCES, INC. AND URI TO DETERMINE WHETHER HRI IS QUALIFIED BY TRAINING AND EXPERIENCE.

The record of HRI's parent and sister corporations, Uranium Resources, Inc. and URI, demonstrates that HRI is not qualified. Moreover, the NRC should consider the records of Uranium Resources, Inc. and URI even though they are technically separate corporations. These records should be considered for several reasons. First, the NRC will disregard corporate forms when the corporations are effectively the same. Second, Uranium Resources, Inc., URI, and HRI are one entity. Third, Uranium Resources, Inc. is responsible for HRI's conduct. Fourth, HRI relies for its expertise on the experience of Uranium Resources, Inc. and URI. Finally, disregarding the corporate structure is necessary to achieve the purposes of the AEA.

A. The NRC Will Disregard Corporate Forms when the Corporations are Effectively Identical.

In determining whether HRI is qualified to conduct the proposed Crownpoint Project, the NRC should take into account the records of Uranium Resources, Inc. and URI because of the identity of the three corporations. The Atomic Safety and Licensing Board recognized the propriety of looking beyond corporate forms on this basis in Sequoyah Fuels Corporation and General Atomics, LBP-94-17, 39 N.R.C. 359 (1994). There, the NRC entered an order holding both Sequoyah, an NRC licensee and General Atomics, Sequoyah's parent corporation, liable for the financial assurance required for Sequoyah's operations.

The Board denied General Atomics' motion to dismiss the order on the grounds that there were genuine issues of material fact as to whether General Atomics had subjected itself to NRC jurisdiction by its involvement in the licensed activities of its subsidiary Sequoyah. The specific factors cited by the Board for consideration in determining the extent of General Atomics' involvement were the exercise of control by General Atomics over Sequoyah, General Atomics' participation in Sequoyah's activities, and General Atomics' intention to post the required financial assurance for Sequoyah. Although ENDAUM and SRIC do not know who will post the required financial assurance for HRI, the evidence demonstrates that Uranium Resources, Inc. participates actively in the management of and controls the activities of HRI.

B. Uranium Resources, Inc., URI, and HRI Are One Entity.

1. HRI is Operated and Directed by Uranium Resources, Inc.

HRI is a wholly owned subsidiary of Uranium Resources, Inc., and is the "operating arm" of Uranium Resources, Inc. in New Mexico. Rev. 2 to Crownpoint Uranium Project Consolidated Operations Plan at 2 (August 15, 1997) (ACN 9708210179) ("COP"); August 19, 1998 letter from Richard F. Clement, Jr. to the NRC ("Clement letter")[2], 1; January 23, 1998 Affidavit of Mark S. Pelizza, filed as Attachment E to HRI's January 26, 1998 Response to ENDAUM and SRIC's Motion for a Stay, Request for a Prior Hearing, and Motion for a Temporary Stay ("Pelizza affidavit"), 1. Moreover, it is clear that HRI does not have its own expertise but relies instead on the expertise of its parent Uranium Resources, Inc. In his affidavit, Mark Pelizza stated that he has:

> personally supervised all radiological and non-radiological health, safety, and environmental permitting activities associated with HRI since the company and the Crownpoint Uranium Project was [sic] conceived. In this capacity all environmental studies, reports, papers, permit and license applications and regulatory requirements have either been completed by me or under my supervision. I have been HRI's representative at numerous public presentations regarding the project over the past decade. I have been HRI's regulatory liaison throughout the project.

Pelizza affidavit, 2. Mr. Pelizza's statement that he has personally supervised all activities since HRI and the Crownpoint Project were conceived strongly suggests that

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[2] This letter is filed as Exhibit F to the Written Testimony of Dr. Michael Sheehan, Ph.D. ("Sheehan testimony"). Dr. Sheehan's testimony is being filed as Exhibit 1 to ENDAUM and SRIC's Brief on Financial Assurance Issues .

HRI exists solely for the purpose of conducting this one project. Finally, Mr. Pelizza also acted for HRI extensively at the events conducted in this matter in Crownpoint in September, 1998.

Mr. Pelizza is not the only Uranium Resources, Inc. employee who works for HRI. According to the April 1998 Uranium Resources, Inc. proxy statement (Exhibit 1), two Uranium Resources, Inc. Vice Presidents, Richard F. Clement, Jr. and Craig S. Bartels, also work for HRI. Mr. Clements in fact is the President of HRI. Exhibit 1 at 7-9. Moreover, according to Mr. Pelizza in his affidavit, Uranium Resources, Inc. "has staffed" HRI.[3] Pelizza affidavit at 5. Not only do employees of Uranium Resources, Inc. operate HRI, but Uranium Resources, Inc. determines who the other HRI personnel will be.

2. HRI, URI, and Uranium Resources, Inc. Report Themselves to the SEC and the Public as One Entity.

Uranium Resources, Inc. also treats itself, HRI, and URI as one operation. The Uranium Resources, Inc. Form 10-K filed with the U.S. Securities and Exchange Commission ("SEC") for the 1997 calendar year[4] repeatedly refers to the Church Rock and Crownpoint properties as properties of the Company, defined (on page 4) as Uranium Resources, Inc. and its consolidated subsidiaries. *See, e.g.*, pages 5, 7, 9, 15, 18, and 50. The same form discusses as part of the Company's operations the

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[3] Mr. Pelizza goes on to say that Uranium Resources, Inc. has staffed HRI, allegedly with several experienced individuals, and cites to an exhibit. Notably, that exhibit contains the resume of only one individual

[4] Exhibit B to the written testimony of David Osterberg ("Osterberg testimony"), filed with this Brief as exhibit 4.

permitting processes in Texas and New Mexico (pages 10-11), reclamation and bonding costs in the two states (pages 22-23), expenses in the two states (pages 32, 40, and 41), and production from properties in Texas (page 38). The three corporations are treated in the same manner in the form 10-Q filed with the SEC on November 16, 1998.[5] *See, e.g.*, pages 8, 10-11, 12-14, and 19-20.

3. Uranium Resources, Inc. is Responsible for HRI's Conduct.

HRI's reliance on the expertise of Uranium Resources, Inc. is confirmed by the COP's organization chart, which indicates that the C.E.O. of Uranium Resources, Inc. is responsible for all of the operations of HRI. COP, 129. That is provided as well in the NRC Staff's Safety Evaluation Report (Safety Evaluation Report, December 5, 1997 ["SER"]); it includes the same organization chart and states that:

> The President of HRI is responsible for the safe operation of the Crownpoint Project. The President reports directly to the C.E.O. of Uranium Resources, Inc.

SER, 4. The ultimate authority for HRI's operations in Church Rock, Crownpoint, and at Unit 1 is Uranium Resources, Inc., and it is that authority on which the Staff relied in issuing a license to HRI. SER at 4. The record that should be examined to determine whether HRI is qualified to conduct the Crownpoint Project is the record of problems compiled by Uranium Resources, Inc. and its subsidiaries.

C. HRI Relies on the Experience of Uranium Resources, Inc. and URI.

Another reason for considering the record of Uranium Resources, Inc. and

[5] Exhibit BB to Osterberg testimony, Exhibit 4.

URI is because that is the record that HRI itself cites. In his affidavit, Mr. Pelizza stated:

> Both URI and HRI are subsidiaries of Uranium Resources, Inc. I believe this experience has been and will continue to be, very useful to HRI.

Pelizza affidavit at 5.

The record of Uranium Resources, Inc. and its subsidiary URI are relied upon by HRI; the problems that those companies have had with *in situ* leach mining therefore should be counted against HRI's qualifications to operate the Crownpoint Project.

D. Disregarding the Corporate Form is Necessary to Achieve the Purposes of the Atomic Energy Act.

The common law "alter ego" doctrine governing the piercing of the corporate veil, which stems from tort and contract actions, has been liberalized in the federal regulatory context. *See, e.g.*, Capital Telephone Company, Inc. v. Federal Communications Commission, 498 F.2d 734 (D.C. Cir. 1974).[6] As the Court noted in the Capital Telephone case, the "strict standards of the common law alter ego doctrine" need not be applied in the context of a license in a regulated industry where "the applicable standard appears in the statute, not in court decisions involving civil suits." 498 F.2d at 738. Thus, "[a]lthough a corporation and its shareholders are

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[6] The court affirmed a ruling by the Federal Communications Commission, which denied the application of the Capital corporation for authority to construct and operate a one-way radio paging station. The decision was based in part on the identity of interest of Capital and another corporate applicant, Bakal, and on the Commission's piercing of the corporate veil to determine that identity of interest. 498 F.2d at 739.

deemed separate entities for most purposes, the corporate form may be disregarded in the interests of justice where it is used to defeat an overriding public policy." Bangor Punta Operations, Inc. v. Bangor & Aroostook Railroad Company, 417 U.S. 703, 713 (1974).[7]

In determining whether to pierce the corporate veil, courts must look at the purpose of the federal statute involved to determine whether the statute places importance on the corporate form. Town of Brookline v. Gorsuch, 667 F.2d 215, 221 (1st Cir. 1981) (holding that where regulations exempted non-profit organizations from financial burdens of complying with the Clean Air Act, the Environmental Protection Agency was allowed to consider that the parent of a regulated for-profit facility was a non-profit organization); Capital Telephone Company, 498 F.2d at 737 (holding that broad, equitable standards of the statute, enacted to further public convenience, clearly supported the Commission's decision to look beyond the corporate entity).

In this case, the fundamental purpose of the AEA is to assure that nuclear facilities licensed by the NRC operate in a manner that does not jeopardize the public health and safety. Union of Concerned Scientists v. Nuclear Regulatory Commission, 824 F.2d 108, 116 (D.C. Cir. 1987) (holding invalid an NRC rule that allowed

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[7] The court held that the shareholder in control of a railroad could not sue the former owners for mismanagement because the shareholder acquired his (continued) interest from those owners after their alleged wrongful conduct occurred. 417 U.S. at 717. The court pointed out in reaching that ruling that it could pierce the corporate veil in order to determine the true substance of the claims and the actual beneficiaries. 417 U.S. at 703.

consideration of costs in the adequate protection standard mandated by the AEA). The regulations adopted by the NRC to implement this mandate require that before it issues a license, the NRC find that an applicant for a license has demonstrated that it is qualified by training and experience to operate the proposed facility in a manner that protects public health and safety and environmental values. 10 C.F.R. § 40.32(b), (e). The NRC's ability to make this determination will be frustrated if HRI is permitted to avoid scrutiny of its parent Uranium Resources, Inc. and sister, URI because they are separate corporations.

The Atomic Safety and Licensing Board has recognized that the AEA does not depend upon the principles of corporate law. In Safety Light Corporation, LBP-95-09, 41 N.R.C. 412, 1995 NRC Lexis 12 (1995), the Board held that the NRC had jurisdiction over USR Industries, whose subsidiary Safety Light Corporation was an NRC licensee for purposes of voiding the transfer of Safety Light's stock without NRC consent. The NRC Staff moved for summary disposition on the issue, and USR argued that principles of corporate law precluded holding a parent corporation (USR) liable for the obligations of its subsidiary (Safety Light). The Board rejected that argument, pointing out that nothing in the legislative history of the pertinent section of the AEA (§ 184) indicated that Congress enacted it with that or any other principle of corporate law in mind. Similarly, in the interests of achieving the mandates of the AEA here, the NRC should consider the record of Uranium Resources, Inc. and URI to determine the nature of HRI's base of experience.

III. URANIUM RESOURCES, INC.'S RECORD DOES NOT SHOW QUALIFICATION BY TRAINING OR EXPERIENCE FOR THE CROWNPOINT PROJECT.

A. Uranium Resources, Inc. has Not Mined under Conditions Like Those at the Crownpoint Project.

The mining that Uranium Resources, Inc. has conducted in South Texas through URI has not been in conditions such as those that will be encountered by HRI at the Church Rock, Crownpoint, and Unit 1 sites in the Crownpoint Project. The ore horizon at the proposed Crownpoint mining site ranges from about 1,840 feet to 2,290 feet below land surface; the comparable depth at the proposed Church Rock site ranges from approximately 760 feet to 1,030 feet below land surface. NUREG-1508, Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint New Mexico (February, 1997) ACN 9703200270 ("FEIS"), 3-12, 3-18. By contrast, *in situ* leach mining in Texas has involved ore horizons at depths of approximately 400 feet to 700 feet, and at injection pressures one-fifth to one-eighth of those predicted at the Church Rock and Crownpoint sites.[8] In addition, mining at the Church Rock site will be conducted within mined-out stopes and the rocks that surround them. This is a condition not experienced by Uranium Resources, Inc. at its Texas operations because uranium mining in Texas has historically been conducted only by the open-pit or solution

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[8] W.D. Conine, "Uranium Solution Mining -- Comparison of New Mexico with South Texas", in Geology and Mineral Technology of the Grants Uranium Region 1979, Memoir 38 (New Mexico Bureau of Mines and Mineral Resources 1980), at 342, submitted as Exhibit 27 to ENDAUM's and SRIC's Statement of Concerns.

mining methods.[9]

The most important difference between Uranium Resources, Inc.'s experience in Texas and the proposed Crownpoint Project mining is the quality of the water impacted by the mining involved. The natural ground water in the South Texas aquifer subject to uranium leaching is substantially poorer quality than the natural water quality in the Westwater Canyon aquifer at the proposed Crownpoint sites. FEIS, 4-37. The Crownpoint mine site also "is unique in that it would be located near a public water supply". FEIS, A-22. According to the NRC Staff, these differences are important in terms of water restoration:

> the Texas sites w[ere] not restored to the same level of water use as anticipated at the Church Rock, Crownpoint, and Unit 1 sites in the Westwater Canyon aquifer. Therefore, NRC Staff does not consider the Texas data as representative for demonstrating restoration at the New Mexico sites.

Id., 4-37.

B. Uranium Resources, Inc. Has a History of Problems and Violations at Other Projects.

Uranium Resources, Inc.'s experience should not be taken as a demonstration of qualifications to conduct the proposed Crownpoint Project because of the problems that Uranium Resources, Inc. has had at its South Texas mines. Uranium Resources, Inc. has conducted *in situ* leach mining through its subsidiary URI, Inc. at four sites in South Texas, Kingsville Dome, Rosita, Benavides, and Langoria.

The problems that URI has had with excursions at the Kingsville Dome site

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[9] *Id.*, 340.

are set forth in Table 3 of the Written Testimony of Dr. William P. Staub, Ph.D. filed as Exhibit 2 to ENDAUM and SRIC's Brief concerning Ground Water Protection Issues. In addition, restoration to the 5 pCi/L radium-226 drinking water standard was not achieved at any of the six separate well fields at the Benavides and Langoria sites; restoration values at those sites ranged from 5.2 pCi/L to 61.3 pCi/L.[10]

Restoration of uranium at Uranium Resources, Inc.'s four Texas sites was equally unsuccessful. Uranium concentrations after restoration did not meet the 0.44 mg/L NRC effluent standard in six of the eight well fields reported, including one each at Uranium Resources, Inc.'s Kingsville Dome and Rosita operating mines, and did not meet the 0.020 mg/L proposed Environmental Protection Agency drinking water standard at seven of the eight well fields.[11] The final restoration value for uranium at the Rosita mine represented a threefold increase in average baseline.[12]

Additional problems caused by URI at one South Texas ranch are outlined in the attached complaint filed in Langoria, et al. v. Uranium Resources, Inc., et al., Duval County, Texas, cause no. 16264 (Exhibit 2).[13] Finally, in a recent inspection

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[10] Mark S. Pelizza, HRI, letter to Joe Holonich, NRC, April 1, 1996, response to Question 52 at 5 and Attachment 52-6, submitted as Exhibit 31 to ENDAUM and SRIC's Statement of Concerns.

[11] *See id.* at 4 and Attachment 52-6.

[12] *Id.*

[13] It is noteworthy that several individuals and entities, including ENDAUM and SRIC, have raised concerns about Uranium Resources, Inc.'s operations through its subsidiary URI in South Texas, but that the NRC Staff has virtually (continued)

of the URI Kingsville Dome facility, the Texas Department of Health found ten violations resulting in a:

> significant, unacceptable deficiency with regard to the application and overall effectiveness of [HRI's] radiation safety program.

November 20, 1998 Texas Department of Health letter to URI, Incorporated (Exhibit 3) at 1. That finding, taken with the other problems that Uranium Resources, Inc. and URI have had, demonstrates that HRI is not qualified to conduct the proposed Crownpoint Project.

IV. THE PROVISIONS OF THE COP AND THE SER PERTAINING TO PERSONNEL DO NOT ESTABLISH ADEQUATE TRAINING AND EXPERIENCE FOR HRI.

The COP and the SER both set forth an organization chart and outline the education and experience that will be required for people to be hired in various positions by HRI for the Crownpoint Project. COP, 128-134; SER, 4-6. Contrary to the suggestion of the Presiding Officer in LBP 98-9, those provisions do not establish qualifications by experience and training to conduct the project.

In accordance with 10 C.F.R. § 40.32(a), the NRC is required to determine that an applicant for a license is qualified to conduct the proposed project, not that the

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ignored these concerns. None of the information contained in the documentation of violations, nor the issue of HRI's qualifications or URI's operating record in Texas, were discussed in the FEIS. ENDAUM and SRIC also can find no evidence that the Staff independently evaluated or even considered the environmental and public health effects of the substantial spills and leaks of process fluids reported by ENDAUM and SRIC at URI's Texas facilities. *See, e.g.*, Paul Robinson, *et al.*, SRIC, "Uranium Mining in Navajo Ground Water: The Risks Outweigh the Benefits" (Comments on the Draft Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico), February 28, 1995, Exhibit 21 to ENDAUM and SRIC's Statement of Concerns.

applicant will become qualified at some point in the future. Moreover, the Staff's issuance of the license based upon a future demonstration of the qualifications of as yet unknown people means that the Staff will have no opportunity to examine and question the credentials of those people. Although that may not be a problem with respect to the required qualifications that are straight forward, such as the need for a college degree, it is a problem with respect to the more flexible required credentials.

For example, the SER states that the Vice President of Technology must have a Bachelor's degree "or equivalent work experience" and that his or her work experience must include "industrial process/production experience, and industrial process/production management". SER, 5. Despite the importance of that position, the SER neither defines those terms nor indicates what is adequate experience in each of the listed areas. By foregoing its opportunity to determine the qualifications of the people to be employed in key positions by HRI, the Staff has abdicated its responsibility to determine whether HRI is qualified pursuant to 10 C.F.R. § 40.32(b).

V. THE STAFF'S RELIANCE ON QUALIFICATIONS THAT HAVE NOT BEEN DETERMINED DEPRIVES ENDAUM AND SRIC OF THEIR RIGHT TO A HEARING.

The AEA and 10 C.F.R. § 40.32(b) require the NRC to determine before issuing a license that the applicant is qualified. Moreover, ENDAUM and SRIC have raised the issue of HRI's qualifications in this proceeding. Statement of Concerns, 102-105. Despite that, the Staff has precluded ENDAUM and SRIC from litigating the sufficiency of the qualifications of specific individuals in this proceeding. That violates ENDAUM and SRIC's hearing rights under § 189(a) of the AEA.[14] *See* Union of Concerned Scientists v. U.S. Nuclear Regulatory Commission, 735 F.2d 1437 (D.C. Cir. 1984) (holding invalid an NRC regulation removing from the § 189(a) hearing process the issue of the results of offsite emergency preparedness).

VI. HRI IS NOT QUALIFIED FINANCIALLY TO CONDUCT THE CROWNPOINT PROJECT.

A. The Regulations Require that Licensees be Financially Capable of Conducting the Projects for which they are Licensed.

Section 40.32 of 10 C.F.R. provides that an application for a license will be approved if five conditions are met. Specifically, items (c) and (d) state:

> (c) The applicant's proposed equipment, facilities, and procedures must be adequate to protect health and minimize danger to life or property; and
>
> (d) The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public ....

10 C.F.R. § 40.32(c), (d).

In addition, item (e) provides that if the application is for a license to possess and use source material for uranium milling, or for the conduct of activity that the Commission has determined will have a significant environmental impact, the NRC must find, after weighing the benefits of the project against its costs, that the proper course is to issue the license with "any appropriate conditions to protect

[14] Because the Staff's actions involve a decision made without consideration of specific qualifications and without an opportunity for public review and comment on those qualifications, the Staff's actions also violate the National Environmental Policy Act, 42 U.S.C. §§ 4332 *et seq.*

environmental values."

Taken together, these provisions clearly indicate that the financial capability of an applicant must be considered by the NRC in determining whether to issue a license. No applicant without adequate financial resources will be able to protect the public health and safety, minimize danger to life and property, or protect environmental values.

The need for consideration of the financial qualifications of a company applying for a license is addressed by Dr. Michael Sheehan, Ph.D. in his written testimony. Exhibit 1 to ENDAUM and SRIC's Financial Assurance Brief. As is indicated in his testimony and in his attached resume, Dr. Sheehan is very well qualified to provide an opinion on this subject. He has B.S., M.A., and Ph.D. degrees in economics from the University of California at Riverside, and he has testified extensively on a variety of economic issues relating to utilities, including utility planning issues in the nuclear context. He also has provided consulting services on utility planning issues to several state utility and energy offices, and has taught many courses in public utility planning and policy, planning economics, energy planning, environmental policy, planning, and other subjects at both the graduate and undergraduate levels. Finally, he has published extensively on utility and other cost and economic planning issues.[15]

Dr. Sheehan has explained the four principal reasons why a license applicant that is not well qualified financially is more likely to have problems that adversely

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[15] Financial Assurance Brief, Exhibit 1 at 1-5; Exhibit 1A at 2-34.

affect the public health and safety and the environment:

> (1) Because the applicant's poor capitalization or financial condition will often mean that there will be a tendency to cut corners on expenditures related to safety, thereby increasing the risk of events adversely affecting public health and safety or the environment;
>
> (2) Greater risk means an increase in the expected number of such events;
>
> (3) Poor capitalization, especially if prices are low relative to costs in product markets, will mean the company will be less able to provide a full and comprehensive response out of operating funds to events affecting public health and safety and the environment;
>
> (4) Operating fund stress due to the need to cope with more and more severe public health and safety and environmental problems will tend to produce a downward spiral in performance.

Financial Assurance Brief Exhibit 1 at 14-15.

These economic factors and the language of 10 C.F.R. § 40.32(c), (d), and (e) indicate that the financial qualifications of an applicant for a license must be considered in determining whether the criteria set forth in § 40.32(c), (d), and (e) have been met. The record in this case demonstrates that those criteria have not been met by HRI.

B. HRI is Not Qualified Financially.

HRI is a company in financial trouble. The specific indications of HRI's financial problems are testified to by Dr. Sheehan in his written testimony. In addition, David Osterberg has explained in his testimony (Exhibit 4) that the uranium mining industry as a whole is having economic problems, problems that adversely affect the economic viability of the proposed Crownpoint Project.

Dr. Sheehan's considerable expertise concerning economic issues has been supplemented in this situation by his review of various documents pertaining to the Crownpoint Project and to HRI specifically. These include the DEIS, FEIS, forms 10-K and 10-Q filed by HRI, HRI's response to a Staff Request for Additional Information, materials about the uranium industry, Energy Information Administration reports on uranium markets, and General Accounting Office reports. In addition, he has discussed these issues with David Osterberg. Financial Assurance Brief Exhibit 1 at 6-7.

In his written testimony, Dr. Sheehan has explained that HRI is not qualified financially to conduct the proposed Crownpoint Project in a responsible manner. He has laid out several indications that HRI is in financial trouble.

First, Uranium Resources, Inc. and its subsidiaries (including HRI) have cash problems. At the end of 1996, the company had $16.9 million in cash; by the end of 1997 this was down to $2,325,000; and by the end of the third quarter of 1998 the company had only $978,515. Similarly, working capital decreased from $15.3 million in 1996 to $6.0 million in 1997 to $4.0 million at the end of the third quarter of 1998. Financial Assurance Brief Exhibit 1 at 19.

Dr. Sheehan has testified as well that the company's prospects for income are also problematic. In its reports filed with the SEC for itself and its subsidiaries (including HRI) Uranium Resources, Inc. indicated that although it had eight long term contracts (its primary source of income) in 1998, it will have only two such contracts in 2002. The company also predicts a decrease in sales by the pound from 1.4 million to 258,000 and a drop in revenue from $21.5 million to $3.5 million during that period. Financial Assurance Brief Exhibit 1 at 18.

Dr. Sheehan has explained that the conditions in uranium markets are affecting HRI's financial viability; the cost of producing uranium for the company is higher than the revenue that the company can generate by selling uranium. The company had a negative cash flow of $1,751,000 during the third quarter of 1998; and the company wrote down the value of its uranium properties and other assets by $18 million during that quarter, leading to a single quarter loss of almost $15 million. Financial Assurance Brief Exhibit 1 at 22.

As Dr. Sheehan has also pointed out, there are several other indications of the company's serious financial condition. First, the company is closing down its production facilities. Second, despite the possibility of losing key qualified personnel the company has not entered into contracts with them. Third, the company's stock has fallen to a low of 16 cents per share in 1998 from a five year high of $17.63; in fact, the stock price has been well below one dollar for an extended period, which reflects the market's analysis of the conditions facing the company and its industry more generally. Financial Assurance Brief Exhibit 1 at 23.

Perhaps most telling is Dr. Sheehan's testimony that the company concedes that it faces a financial crisis, is reducing personnel and other costs, is looking to sell, and plans to reduce expenditures relating to those properties 60 to 70 percent. Financial Assurance Brief Exhibit 1 at 23-26.

C. Conducting the Crownpoint Project will Not Improve HRI's Financial Position.

Dr. Sheehan has testified that HRI is in financial trouble. Moreover, the market for uranium is also in poor economic condition, and mining uranium at Church Rock and Crownpoint will not improve HRI's financial situation. The problems facing the uranium mining industry and the reasons why HRI would not benefit financially from conducting the Crownpoint Project are outlined in the attached written testimony of David Osterberg (Exhibit 4), whose training and experience provide him with substantial expertise in the analysis of the market.

Mr. Osterberg has been found qualified to testify as an expert on energy economics by the NRC in the case involving the proposed siting by Louisiana Energy Systems of a nuclear enrichment facility. He has Bachelor of Arts and Masters Degrees in economics as well as Masters Degrees in water resources management and agricultural economics. He has taught economics at the college level, and has served on energy committees and councils as a member of the Iowa State Legislature. He also has testified before regulatory commissions in several states and has worked on energy issues in various other contexts. Exhibit 4 at 1-2. Mr. Osterberg's qualifications are more fully set forth in his resume, attached as Exhibit 4A.

Mr. Osterberg is familiar with the proposed Crownpoint Uranium Solution Mining Project and with the economics of the uranium mining industry as a whole, having reviewed the FEIS, data from the Energy Information Administration of the U.S. Department of Energy, industry publications, and economic papers and texts. He also discussed the issues addressed in his testimony with his partner Michael Sheehan and other experts. Exhibit 4 at 2.

The nature of the uranium market is explained by Mr. Osterberg, who has pointed out that it is not totally free because of the large amount of government intervention. Nevertheless, as he also has stated, the market is free enough that the vast amount of uranium that exists and the decreasing demand for it are having predictable effects on the market. Exhibit 4 at 4-5.

There are two key components to the market for uranium that might be produced by the Crownpoint Project, supply and demand. The demand for uranium comes from various commercial nuclear electric generating units located in the United States and around the world. Uranium Resources, Inc. stated in its most recent form 10-K that power plant fuel is the only significant use for uranium. Exhibit 4 at 5. Mr. Osterberg also has explained that the Energy Information Administration of the Department of Energy predicts that there will be no growth in the world wide capacity for nuclear fuel between 1996 and 2000, and that there will be only a 1 percent growth during the entire ten year period from 2000 to 2010. The Energy Information Administration has indicated as well that demand is likely to decrease for at least the next ten years after 2010. Exhibit 4 at 5-6.

There are several reasons for the decreasing demand for uranium. First, the number of nuclear power plants in this country is decreasing because fewer new units are being built and because existing units are being closed, in some cases because they are uneconomical and in others because they are performing poorly. In addition, demand for nuclear fuel has stalled in Western Europe and construction of nuclear power plants in Asia is being hurt by the economic turn down there. For these and other reasons, Mr. Osterberg's professional opinion is that the demand for nuclear fuel is not sound nor will it be in the near future. Exhibit 4 at 6-18. It also is his opinion that the difficulties being experienced by Uranium Resources, Inc. are consistent with the problems of the market situation generally. Exhibit 4 at 15.

The demand for uranium therefore is not at all favorable for a new mining operation such as the Crownpoint Project. In addition, there are substantial sources of uranium supply that would compete with uranium produced by the Crownpoint Project. Existing mines accounted for about 58% of the uranium used by nuclear power plants in 1997, and eight mines owned by five companies accounted for two thirds of the uranium produced in the Western World. Uranium Resources, Inc. has described its competitors as "15 major uranium producing entities, some of which are significantly larger and better capitalized than they are." In addition to these sources, military uranium and plutonium from the United States and other countries account for significant new sources of uranium. Exhibit 4 at 20-28.

These sources are significant. Moreover, the U.S. Enrichment Corporation announced in July 1998 that its inventories are roughly 75 million pounds U308 equivalent. According to Uranium Resources, Inc., that announcement pushed the price of uranium down almost $2.00 per pound. Finally, technological changes in the enrichment of uranium have lead to increased efficiency thereby decreasing the amount of uranium needed. Exhibit 4 at 28-31.

The result of these market forces is that it is not likely that HRI will benefit from mining uranium at Church Rock and Crownpoint. The average production costs for the entire project are projected to be at least $9.40 per pound, and the production costs at Church Rock range between $11.32 and $11.83 per pound. Industry analysts predict that the price of per pound of U308, on the other hand, will average only $6.00 to $8.00 for a significant time into the future, and those are reasonable and realistic predictions. The inescapable conclusion is that mining uranium at Church Rock and Crownpoint will not be economically viable, and will do nothing to improve HRI's financial qualifications to conduct that mining.

CONCLUSION

HRI is not qualified either by training and experience or financially to conduct the proposed Crownpoint Project. The Staff's issuance of a license to HRI therefore violated the Atomic Energy Act and its implementing regulations. In addition, the manner in which the Staff has dealt with the issue of HRI personnel qualifications violates the National Environmental Policy Act. For those reasons and because the Staff has acted in violation of the Administrative Procedures Act, the issuance of that license should be reversed.

Dated: January 11, 1999.

Douglas Meiklejohn

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DOCKETED
USNRC

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

'99 JAN 15 A11 :24

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

In the Matter of	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
2929 Coors Road, Suite 101	)	ASLBP No. 95-706-01-ML
Albuquerque, NM 87120	)	January 11, 1999

CERTIFICATE OF SERVICE

I hereby certify that:

On January 11, 1999, I caused to be served copies of the following:

ENDAUM and SRIC's Brief in Opposition to Hydro Resouces, Inc.'s Application for a Materials License with Respect to: HRI's Lack of Technical and Financial Qualifications

via e-mail and upon the following persons marked by an asterisk (*) by Federal Express, standard overnight delivery, and upon the following persons marked by a (+) by U.S. mail, first class, in accordance with the requirements of 10 C.F.R. § 2.712:

Office of the Secretary*
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852
Attn: Rulemakings and Adjudications Staff

Office of Commission Appellate Adjudication*
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Administrative Judge
Peter B. Bloch*
Atomic Safety and Licensing Board
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

Administrative Judge
Thomas D. Murphy*
Special Assistant
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President, ENDAUM
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Crownpoint, NM 87313

Chris Shuey+
Paul Robinson
SRIC
P.O. Box 4524
Albuquerque, NM 87106

Signed at Santa Fe, NM, January 11, 1999

Douglas Meiklejohn

Douglas Meiklejohn

DEFINITIVE PROXY STATEMENT

PROXY STATEMENT PURSUANT TO SECTION 14(A)
OF THE SECURITIES EXCHANGE ACT OF 1934
(AMENDMENT NO.__________)

Filed by the Registrant [X]

Filed by a Party other than the Registrant [ ]

Check the appropriate box:

[ ] Preliminary Proxy Statement

[ ] Confidential For Use of the Commission Only (as permitted by Rule 14a-6(c)(2))

[X] Definitive Proxy Statement

[ ] Definitive Additional Materials

[ ] Soliciting Material Pursuant to Section 240.14(a) - 11(c) or 240.14a-12

URANIUM RESOURCES, INC.

(Name of Registrant as Specified in Its Charter)

(Name of Person(s) Filing Proxy Statement if other than the Registrant)

[ ] Payment of Filing Fee (Check the appropriate box):

[X] No fee required.

[ ] Fee computed on table below per Exchange Act Rules 14a-6(i)(1) and 0-11:

(1) Title of each class of securities to which transaction applies:

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(2) Aggregate number of securities to which transaction applies:

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(3) Per unit price or other underlying value of transaction computed pursuant to Exchange Act Rule 0-11: (Set forth the amount on which the filing fee is calculated and state how it was determined.)

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(4) Proposed maximum aggregate value of transaction:

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(5) Total fee paid:

[ ] Fee paid previously with preliminary materials.

[ ] Check box if any part of the fee is offset as provided by the Exchange Act Rule 0-11(a)(2) and identify the filing for which the offsetting fee was paid previously. Identify the previous filing by registration statement number, or the Form or Schedule and the date of its filing.

(1) Amount Previously Paid:

---

(2) Form, Schedule or Registration No.:

---

(3) Filing Party:

---

(4) Date Filed:

URANIUM RESOURCES, INC.
12750 MERIT DRIVE, SUITE 1020
DALLAS, TEXAS 75251

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS
TO BE HELD JUNE 5, 1998

To the Stockholders of
URANIUM RESOURCES, INC.:

NOTICE IS HEREBY GIVEN that the Annual Meeting of Stockholders of Uranium Resources, Inc., a Delaware corporation (the "Company"), will be held at the Landmark Club, 12740 Merit Drive, Dallas, Texas 75251 on Friday, June 5, 1998, at 9:00 a.m., local time, for the following purposes:

1. To elect four (4) directors of the Company to serve until the next annual meeting of stockholders or until their respective successors shall be elected and qualified;

2. To consider and vote upon a proposal to amend the Company's 1995 Stock Incentive Plan to increase the number of shares of the Company's Common Stock, $.001 par value per share, eligible for issuance under the Plan from 750,000 shares to 1,250,000 shares.

3. To consider and vote upon a proposal to ratify the selection of Arthur Andersen, LLP, independent accountants, as independent auditors for the Company for the fiscal year ending December 31, 1998; and

4. To transact such other business as may properly come before the Meeting or any adjournment thereof.

Only stockholders of record at the close of business on April 17, 1998, are entitled to notice of and to vote at the Meeting or any adjournment thereof.

STOCKHOLDERS ARE CORDIALLY INVITED TO ATTEND THE MEETING IN PERSON. WHETHER OR NOT YOU PLAN TO BE PRESENT AT THE MEETING, YOU ARE REQUESTED TO SIGN AND RETURN THE ENCLOSED PROXY IN THE ENCLOSED ENVELOPE SO THAT YOUR SHARES MAY BE VOTED IN ACCORDANCE WITH YOUR WISHES AND IN ORDER THAT THE PRESENCE OF A QUORUM MAY BE ASSURED. THE GIVING OF SUCH PROXY WILL NOT AFFECT YOUR RIGHT TO VOTE IN PERSON, SHOULD YOU LATER DECIDE TO ATTEND THE MEETING. PLEASE DATE AND SIGN THE ENCLOSED PROXY AND RETURN IT PROMPTLY IN THE ENCLOSED ENVELOPE. YOUR VOTE IS IMPORTANT.

By Order of the Board of Directors

/s/ Thomas H. Ehrlich

Thomas H. Ehrlich, Secretary

DALLAS, TEXAS

April 27, 1998

URANIUM RESOURCES, INC.
12750 MERIT DRIVE, SUITE 1020
DALLAS, TEXAS 75251

PROXY STATEMENT

FOR

ANNUAL MEETING OF STOCKHOLDERS

TO BE HELD JUNE 5, 1998

This Proxy Statement is furnished to stockholders of Uranium Resources, Inc., a Delaware corporation (the "Company"), in connection with the solicitation of proxies by the Board of Directors of the Company for use at the Annual Meeting of Stockholders (the "Meeting") to be held at the Landmark Club, 12740 Merit Drive, Dallas, Texas 75251 on Friday, June 5, 1998, at 9:00 a.m., local time, for the purposes set forth in the accompanying Notice of Annual Meeting of Stockholders. The approximate date on which this Proxy Statement and the enclosed Proxy will first be sent to stockholders is April 27, 1998.

ACTION TO BE TAKEN AT THE MEETING

Shares represented by a properly executed proxy, unless the stockholder otherwise instructs in the Proxy, will be voted (a) for the election of the four individuals named under the caption Election of Directors as directors of the Company; (b) for the amendment to the 1995 Stock Incentive Plan to increase the number of shares of Common Stock issuable thereunder to 1,250,000; (c) for the ratification of the selection of Arthur Andersen, LLP, independent accountants, as independent auditors of the Company for the fiscal year ending December 31, 1998; and (d) at the discretion of the proxy holders on any other matter or business that may be properly presented at the Meeting or any adjournment thereof. Where a stockholder properly executes a proxy and gives instructions on how his shares are to be voted, the shares will be voted in accordance with those instructions.

A proxy may be revoked at any time by a stockholder before it is exercised by giving written notice to the Secretary of the Company, or by signing and delivering a proxy which is dated later, or, if the stockholder attends the Meeting in person, by either notice of revocation to the inspectors of election at the Meeting or by voting at the Meeting.

The only matters that management intends to present at the Meeting are the three matters referenced in subparagraphs (a), (b) and (c) above. If any other matter or business is properly presented at the Meeting, the proxy holders will vote upon it in accordance with their best judgment.

VOTING SECURITIES

The record date for the Meeting is April 17, 1998. Only stockholders of record at the close of business on that date will be entitled to vote at the Meeting. At the close of business on that date, there were issued and outstanding 12,053,027 shares of the Company's Common Stock entitled to one vote per share. In the election of directors, cumulative voting is not allowed. A majority of the outstanding Common Stock, present in person or by Proxy and entitled to vote, will constitute a quorum for the transaction of business at the Meeting. Under Delaware law and the Company's Bylaws, if a quorum is present at the Meeting: (i) to

be elected a director, each nominee must receive a plurality of the votes of the shares present in person or by Proxy at the Meeting and entitled to vote on the matter, and (ii) the affirmative vote of the majority of shares present in person or by Proxy at the Meeting and entitled to vote on the matter is required to (a) amend the 1995 Stock Incentive Plan to increase the number of shares of Common Stock issuable thereunder to 1,250,000; (b) ratify the selection of Arthur Andersen, LLP, as independent auditors of the Company for the fiscal year ending December 31, 1998, and (c) approve any other matter submitted to a vote of stockholders at the Meeting. In the election of directors, any action other than a vote for a nominee will have the practical effect of voting against the nominee. Abstention from voting on any matter presented at the Meeting will have the practical effect of voting against any such matter since it is one less vote for approval. Broker non-votes on any matter will not be considered "shares present" for voting purposes.

BENEFICIAL OWNERSHIP OF THE COMPANY'S COMMON STOCK

The following table sets forth, as of March 31, 1998, certain information regarding persons known by the Company to be the beneficial owner of more than 5% of the outstanding shares of the Company's Common Stock. Shown separately in the second table below is certain information regarding the beneficial ownership of the Company's Common Stock by (i) each director and nominee for director of the Company, (ii) each of the executive officers named in the Summary Compensation Table set forth below under the caption Executive Compensation, and (iii) all directors and executive officers as a group.

PRINCIPAL STOCKHOLDERS

NAME AND ADDRESS OF BENEFICIAL OWNER	AMOUNT AND NATURE OF BENEFICIAL OWNERSHIP(1)	PERCENT OF CLASS(2
Barry R. Feirstein Feirstein Capital Management Corp. 767 Third Avenue, 28th Floor New York, NY 10017	1,562,100	13.0%
Lindner Growth Fund 7711 Carondelet Avenue, Suite 700 Clayton, MO 63105	855,525(3)	5.9%

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1 Each person has sole voting and investment power with respect to the shares listed, unless otherwise indicated. Beneficial ownership includes shares over which the indicated beneficial owner exercises voting and/or investment power.

2 The shares owned by each person, and the shares included in the total number of shares outstanding, have been adjusted, and the percentages owned have been computed, in accordance with Rule 13d-3(d)(1) under the Securities Exchange Act of 1934. Shares subject to options or warrants currently exercisable or exercisable within 60 days are deemed outstanding for computing the percentage ownership of the person holding such options or warrants, but are not deemed outstanding for computing the percentage ownership of any other person.

3 Lindner Growth Fund, Lindner Dividend Fund, Lindner Bulwark Fund, Lindner Utility Fund and Lindner Ryback Small Cap (the "Lindner Group") are members of the same family of mutual funds and may be deemed collectively as a controlling stockholder of the Company. The Lindner Group is managed by Ryback Management Corporation ("Ryback"), an investment adviser. Ryback has discretionary authority over the shares owned beneficially by the Lindner Group, including the power to vote and dispose of such shares.

NAME AND ADDRESS OF BENEFICIAL OWNER	AMOUNT AND NATURE OF BENEFICIAL OWNERSHIP(1)	PERCENT OF CLASS(2
Lindner Dividend Fund 7711 Carondelet Avenue, Suite 700 Clayton, MO 63105	2,964,000(4)	20.4%
Lindner Bulwark Fund 7711 Carondelet Avenue, Suite 700 Clayton, MO 63105	1,150,000(5)	7.9%
Lindner Utility Fund 7711 Carondelet Avenue, Suite 700 Clayton, MO 63105	200,000	1.4%
Lindner Ryback Small Cap 7711 Carondelet Avenue, Suite 700 Clayton, MO 63105	50,000	0.4%
John A. Levin & Co., Inc. One Rockefeller Plaza, 25th Floor New York, NY 10020	626,900	5.2%
Dimensional Fund Advisors 1299 Ocean Avenue, 11th Floor Santa Monica, CA 90401	819,200	6.8%
Santa Fe Pacific Gold Corporation (a wholly owned subsidiary of Newmont Gold Company) 1700 Lincoln Street Denver, CO 80203	1,200,000	10.0%

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(4) Includes 839,000 outstanding shares owned beneficially by Lindner Dividend Fund, 1,500,000 shares issuable upon conversion of certain notes and 625,000 shares issuable upon exercise of certain warrants.

(5) Includes 500,000 shares issuable upon conversion of certain notes and 375,000 shares issuable upon exercise of certain warrants.

MANAGEMENT

NAME OF BENEFICIAL OWNER	AMOUNT AND NATURE OF BENEFICIAL OWNERSHIP(1)	PERCENT OF CLASS(2)
Paul K. Willmott	186,256(3)	1.4%
Joe H. Card	15,452(4)	*
Leland O. Erdahl	118,000(5)	*
George R. Ireland	149,750(6)	*
James B. Tompkins	110,750(7)	*
Richard F. Clement, Jr.	174,601(8)	1.4%

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* Less than 1%.

(1) Each person has sole voting and investment power with respect to the shares listed, unless otherwise indicated. Beneficial ownership includes shares over which the indicated beneficial owner exercises voting and/or investment power.

(2) The shares owned by each person, and the shares included in the total number of shares outstanding, have been adjusted, and the percentages owned have been computed, in accordance with Rule 13d-3(d)(1) under the Securities Exchange Act of 1934. Shares subject to options currently exercisable or exercisable within 60 days are deemed outstanding for computing the percentage ownership of the person holding such options, but not deemed outstanding for computing the percentage ownership of any other person.

(3) Includes 185,256 shares that may be obtained by Mr. Willmott through the exercise of stock options which are currently exercisable. Does not include 178,894 shares that may be obtained by Mr. Willmott through the exercise of stock options exercisable more than 60 days from the date hereof.

(4) Includes 15,452 shares that may be obtained by Mr. Card through the exercise of stock options which are currently exercisable. Does not include 36,602 shares that may be obtained by Mr. Card through the exercise of stock options exercisable more than 60 days from the date hereof.

(5) Includes 116,500 shares that may be obtained by Mr. Erdahl through the exercise of stock options which are currently exercisable. Does not include 7,500 shares that may be obtained by Mr. Erdahl through the exercise of stock options exercisable more than 60 days from the date hereof.

(6) Includes 110,750 shares that may be obtained by Mr. Ireland through the exercise of stock options which are currently exercisable. Does not include 12,250 shares that may be obtained by Mr. Ireland through the exercise of stock options exercisable more than 60 days from the date hereof.

(7) Includes 110,750 shares that may be obtained by Mr. Tompkins through the exercise of stock options which are currently exercisable. Does not include 12,250 shares that may be obtained by Mr. Tompkins through the exercise of stock options exercisable more than 60 days from the date hereof.

(8) Includes 69,201 shares that may be obtained by Mr. **Clement** through the exercise of stock options which are currently exercisable. Does not include 99,499 shares that may be obtained by Mr. **Clement** through the exercise of stock options exercisable more than 60 days from the date hereof.

NAME OF BENEFICIAL OWNER	AMOUNT AND NATURE OF BENEFICIAL OWNERSHIP(1)	PERCENT OF CLASS(2)
Rihard A. Van Horn	13,750(9)	*
Craig S. Bartels	13,575(10)	*
All executive officers and directors as a group (10 persons)	973,305(11)	7.6%

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(9) Includes 13,750 shares that may be obtained by Mr. Van Horn through the exercise of stock options which are currently exercisable. Does not include 66,250 shares that may be obtained by Mr. Van Horn through the exercise of stock options exercisable more than 60 days from the date hereof.

(10) Includes 13,425 shares that may be obtained by Mr. Bartels through the exercise of stock options which are currently exercisable. Does not include 46,275 shares that may be obtained by Mr. Bartels through the exercise of stock options exercisable more than 60 days from the date hereof.

(11) Includes 679,256 shares that may be obtained through the exercise of stock options which are currently exercisable or will become exercisable within 60 days.

ELECTION OF DIRECTORS
(PROPOSAL 1 ON PROXY CARD)

Under the Company's Bylaws and pursuant to a resolution of the Board of Directors, the Board of Directors has fixed the size of the Board at four. Directors are elected to serve until the next annual meeting of stockholders or until their successors are elected and qualified. The Company's Board of Directors is not divided into classes; therefore, all four directors are to be elected at the Meeting.

Unless authority is withheld, it is intended that the shares represented by a properly executed Proxy will be voted for the election of all of the nominees (Paul K. Willmott, Leland O. Erdahl, George R. Ireland and James B. Tompkins) as directors. The nominees are currently all the members of the Company's Board of Directors. If these nominees are unable to serve for any reason, such Proxy will be voted for such persons as shall be designated by the Board of Directors to replace such nominees. The Board of Directors has no reason to expect that these nominees will be unable to serve.

The following table sets forth certain information concerning the individuals nominated for election as directors of the Company:

Name	Age	Positions and Offices with the Company
Paul K. Willmott	58	Chairman, Chief Executive Officer, President and Director
Leland O. Erdahl	69	Director
George R. Ireland	41	Director
James B. Tompkins	41	Director

NOMINEES FOR DIRECTOR

PAUL K. WILLMOTT has served as a director of the Company since August 1994, as President of the Company since February 1995, as Chief Financial and Accounting Officer from April 12, 1995 through September 25, 1995 and as Chairman of the Board and Chief Executive Officer since July 31, 1995. Mr. Willmott retired from Union Carbide Corporation ("Union Carbide") where he was involved for 25 years in the finance and operation of Union Carbide's world-wide mining and metals business. Most recently, Mr. Willmott was President of UMETCO Minerals Corporation, a wholly-owned subsidiary of Union Carbide, from 1987 to 1991, where he was responsible for Union Carbide's uranium and vanadium businesses. From January 1993 until February 1995, Mr. Willmott was engaged by the Concord Mining Unit as a senior vice president where he was primarily involved in the acquisition of UMETCO Minerals Corporation's uranium and vanadium operating assets. Mr. Willmott graduated from Michigan Technological University with a Bachelor of Science degree in Mining in 1964 and a Bachelor of Science Degree in Engineering Administration in 1967. He has been an active member of the American Institute of Mining Engineers, the Canadian Institute of Mining Engineers and a number of state professional organizations.

LELAND O. ERDAHL has served as a director of the Company since July 11, 1994. Mr. Erdahl previously served as President and Chief Executive Officer for Stolar, Inc. from 1986 to 1991. Stolar was a high-tech company involved in the radio wave imaging of geologic media and underground radio transmission for voice and data. He was also President and CEO of Albuquerque Uranium Corporation, a uranium mining company, from 1987 to 1991. He is a Certified Public Accountant and is a graduate from the College of Santa Fe. He is currently a director of Hecla Mining Company, Canyon Resources

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Corporation, Original Sixteen to One Mine, Inc., AMAX Gold, Inc. and a trustee for a group of John Hancock Mutual Funds. He is also a director of Santa Fe Ingredients Company of California, Inc. and Santa Fe Ingredients Company, Inc., both private food processing companies. In March 1997, Mr. Erdahl entered into a contract with AMAX Gold, Inc. to serve as Vice President and Chief Financial Officer. Mr. Erdahl also serves on the compensation committee of Hecla Mining Company, Canyon Resources Corporation, Original Sixteen to One Mine, Inc. and Freeport McMohen Copper & Gold, Inc.

GEORGE R. IRELAND has served as a director since May 25, 1995. Mr. Ireland is a financial analyst for and a partner in Knott Partners L.P., a private investment partnership. Mr. Ireland specializes in investing in securities of natural resource and other basic industrial companies, both domestically and abroad. From 1987 to 1991, he was a Vice President of Fulcrum Management, Inc., which was the manager of the VenturesTrident Limited Partnerships, (venture capital funds dedicated to investing in the mining industry), and Senior Vice President and Chief Financial Officer of MinVen Gold Corporation, a company in which the VenturesTrident funds had a significant investment. Mr. Ireland graduated from the University of Michigan with degrees in Geology and Resource Economics. He also attended the Graduate School of Business Administration of New York University. Mr. Ireland is a director of Merrill & Ring, Inc., a private land and timber holding company in the state of Washington. Mr. Ireland acted as a consultant to Ryback Management Corporation and performed due diligence on the Company in connection with Ryback's loan of $6 million to the Company on behalf of members of the Lindner Group in 1995 discussed elsewhere in this Proxy Statement. Mr. Ireland is not otherwise affiliated with the Lindner Group or Ryback.

JAMES B. TOMPKINS has served as a director since May 25, 1995. Mr. Tompkins is a registered investment advisor doing business as Tompkins & Company. From 1988 until 1990, Mr. Tompkins acted as a sole proprietor of Tompkins & Company, advising creditors of companies in bankruptcy as to the value of claims and realizing proceeds on those claims. In that capacity, Mr. Tompkins acted as a registered investment advisor. Between October 1990 and April 1993, Mr. Tompkins was employed by Columbia Savings as a bond manager where he was responsible for real estate loan workouts and asset disposition. He is an attorney and a Chartered Financial Analyst. Mr. Tompkins graduated from the University of Alabama in 1979 and received his Juris Doctor from the University of Alabama School of Law in 1983. Mr. Tompkins acted as a consultant to Ryback and performed due diligence on the Company in connection with Ryback's loan of $6 million to the Company on behalf of members of the Lindner Group in 1995 as discussed elsewhere in this Proxy Statement. Mr. Tompkins is not otherwise affiliated with the Lindner Group or Ryback.

ARRANGEMENTS REGARDING ELECTION OF DIRECTORS

On May 25, 1995, George R. Ireland and James B. Tompkins were appointed to the Board of Directors following the closing of certain transactions with the Lindner Group. In connection with these transactions, the Company has agreed to nominate two individuals designated by the Lindner Group for election to the Board. Messrs. Ireland and Tompkins are the Lindner Group's designees.

OTHER EXECUTIVE OFFICERS

The following table sets forth certain information concerning executive officers who are not also directors of the Company:

Name	Age	Positions and Offices with the Company
Joe H. Card	44	Senior Vice President - Marketing
Richard F. Clement, Jr.	54	Senior Vice President - Exploration and President - Hydro Resources, Inc.
Richard A. Van Horn	51	Senior Vice President - Operations
Thomas H. Ehrlich	38	Vice President, Chief Financial Officer, Secretary and Treasurer
Mark S. Pelizza	45	Vice President - Health, Safety and Environmental Affairs
Craig S. Bartels	49	Vice President - Technology - Hydro Resources, Inc.

The following sets forth certain information concerning the business experience of the foregoing executive officers during the past five years.

JOE H. CARD joined the Company as Vice President - Marketing in March 1989. In February 1993, he was promoted to Senior Vice President - Marketing. Previously, he spent four years with UG U.S.A., Inc., a U.S. marketing subsidiary of a major German mining company, most recently as Marketing Manager. His responsibilities were related to the entire uranium fuel cycle, primarily in dealing with U.S. nuclear utilities customers. Prior to his work at UG U.S.A., Inc., Mr. Card spent five years with Mitsubishi International Corporation as marketing manager. He earned a B.B.A. degree in Finance from the University of Georgia in 1975 and an M.B.A. from Georgia State University in 1978.

RICHARD F. CLEMENT, JR. joined the Company as Vice President-Exploration in 1983. In April 1990, he was appointed Senior Vice President-Exploration. Mr. **Clement** was a director of the Company from February 1985 to July 1994 at which time he resigned his positions as director and officer of the Company. During the period from July 1994 to February 1996, Mr. **Clement** remained with the Company as Exploration Manager. In February 1996, he was again appointed Senior Vice President-Exploration of the Company as well as the President and a Director of Hydro Resources, Inc., a wholly owned subsidiary of the Company. Prior to joining the Company, he spent 16 years with Mobil Oil Corporation, most recently as vice president and exploration manager for Mobil Energy Minerals-Australia, where he initiated and managed Mobil's Australian coal, uranium and other minerals exploration and acquisition programs. Mr. **Clement** received his B.S. degree in Geology from Boston College in 1965 and his M.S. degree in Geology from the University of Vermont in 1967.

RICHARD A. VAN HORN joined the Company in March 1997 and assumed the position of Senior Vice President of Operations on April 1, 1997. Previously, he spent three years with Energy Fuels Nuclear, Inc. as General Manager - Colorado Plateau Operations with responsibility for the daily management of and planning for Energy Fuels Nuclear, Inc. mining activities on the Colorado Plateau. Prior to his work at

Energy Fuels Nuclear, Inc., Mr. Van Horn spent eighteen years with Union Carbide Corporation where he was involved with the finance and operation of that company's worldwide mining and metals business. From 1990 to 1994, Mr. Van Horn was Director of Operations of UMETCO Minerals Corporation, a wholly owned subsidiary of Union Carbide Corporation, responsible for all operating aspects of UMETCO's uranium and vanadium business on the Colorado Plateau prior to its sale to Energy Fuels Nuclear, Inc. Mr. Van Horn graduated from the Colorado School of Mines with a Engineer of Mines degree in mining in 1973.

THOMAS H. EHRLICH, a certified public accountant, rejoined the Company in September 1995 as Vice President and Chief Financial Officer and was appointed Secretary and Treasurer of the Company in December 1995. Immediately prior to that, Mr. Ehrlich spent nine months as a Division Controller with Affiliated Computer Services, Inc., an information technology services provider in Dallas, Texas. Prior to that, he joined the Company in November 1987 as Controller-Public Reporting and was promoted to Controller and Chief Accounting Officer in February 1990. In February 1993, Mr. Ehrlich assumed the additional duties of Vice President and Secretary of the Company. Prior to joining the Company, he spent four years with Deloitte Haskins & Sells and worked primarily with clients that were publicly held companies. Prior to his work at Deloitte Haskins & Sells, he spent three years in various accounting duties at Enserch Exploration, Inc., an oil and gas company in Dallas, Texas. Mr. Ehrlich received his B.S. B.A. degree in Accounting from Bryant College in 1981.

MARK S. PELIZZA has served as the Company's Environmental Manager since 1980, and as such, he has been responsible for all environmental regulatory activities. In February 1996, he was appointed Vice President Health, Safety and Environmental Affairs of the Company. Prior to joining the Company, he was employed for two years by Union Carbide as an Environmental Planning Engineer at Union Carbide's Palangana solution mining plant in South Texas. Mr. Pelizza received a M.S. Degree in Engineering Geology from Colorado School of Mines in 1978 and a B.S. Degree in Geology from Fort Lewis College in 1974.

CRAIG S. BARTELS, a Registered Professional Engineer, rejoined the Company as Vice President-Technology of Hydro Resources, Inc., a wholly owned subsidiary of the Company in July 1996. From January 1995 to July 1996, he was Manager of Wellfield Operations for Crow Butte Resources, Inc., a uranium ISL mining company. Mr. Bartels originally joined the Company in early 1981 and held varied positions with the Company as Reservoir Engineer, Plant Manager, and Manager of Wellfield Operations through October 1994. Earlier, he was with Union Carbide, eventually becoming Technical and Plant Superintendent for their solution mining operation. Mr. Bartels also spent six years with Natural Gas Pipeline Company of America, a major gas transmission company, as drilling and reservoir engineer for their gas storage operations. Mr. Bartels received a B.S. Degree in Petroleum Engineering from Montana School of Mines in 1972.

The officers of the Company hold office until their successors are appointed by the Board of Directors. All officers of the Company are employed on a full-time basis. There is no family relationship between any director and executive officer of the Company.

BOARD AND COMMITTEE MEETINGS

The Board of Directors held seven formal meetings through both direct meetings and telephonic meetings during the year ended December 31, 1997. Each director attended all of the meetings except for Leland O. Erdahl who did not attend the March 24 meeting but submitted a memorandum stating his support for the Santa Fe transaction discussed and approved at such meeting. The Company's officers have made a practice of keeping directors informed of corporate activities by personal meetings and telephone discussions.

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(1) Represents amount paid for out-of-pocket medical and dental expenses under the Company's Supplemental Health Care Plan.

(2) Represents contributions made by the Company under the Company's 401(k) Profit Sharing Plan (see "401(k) Profit Sharing Plan" below); and for Mr. Clement in 1997 includes moving costs received upon his relocation to Albuquerque, New Mexico ($84,281) and for Mr. Van Horn in 1997 includes moving costs received upon his relocation to Corpus Christi, Texas ($19,349).

SUPPLEMENTAL HEALTH CARE PLAN

The Company has adopted a health care plan (the "Supplemental Plan") for the officers of the Company and certain of the employees of the Company who are also stockholders, which supplements the standard health care plan available to all eligible employees of the Company (the "Standard Plan"). The Supplemental Plan pays directly to the participant 80% of all out-of-pocket medical and dental expenses not covered under the Standard Plan, including deductibles and co-insurance amounts. Additionally, the Supplemental Plan provides to each participant $100,000 of accidental death and dismemberment insurance protection and a world wide medical assistance benefit. Each participant in the Supplemental Plan may receive a maximum annual benefit of $50,000 or $100,000, at the Company's option. The Company pays an annual premium under the Supplemental Plan equal to $210 per participant plus 10% of claims paid. There are currently ten officers and employees covered by the Supplemental Plan.

401(K) PROFIT SHARING PLAN

The Company maintains a defined contribution profit sharing plan for employees of the Company (the "401(k)") that is administered by a committee of trustees appointed by the Company. All Company employees are eligible to participate upon the completion of six months of employment, subject to minimum age requirements. Each year the Company makes a contribution to the 401(k) out of its current or accumulated net profits (as defined) in an amount determined by the Board of Directors but not exceeding 15% of the total compensation paid or accrued to participants during such fiscal year. The Company's contributions are allocated to participants in amounts equal to 25% (or a higher percentage, determined at the Company's discretion) of the participants' contributions, up to 4% of each participant's gross pay. For the plan year ended July 31, 1997, the Company contributed amounts equal to 50% of the participant's contributions, up to 4% of gross pay. For the plan year ended July 31, 1996, the Company contributed amounts equal to 75% of the participants' contribution, up to 4% of gross pay. For the plan year ended July 31, 1995, the Company contributed amounts equal to 50% of the participants' contributions, up to 4% of gross pay. Participants become 20% vested in their Company contribution account for each year of service until full vesting occurs upon the completion of five years of service. Distributions are made upon retirement, death or disability in a lump sum or in installments.

STOCK OPTION PLANS

On December 19, 1995, the Company's Stockholders approved the 1995 Stock Incentive Plan (the "1995 Plan") for key employees of the Company. The 1995 Plan initially authorized grants of incentive stock options and non-qualified options to purchase up to an aggregate of 750,000 shares of Common Stock. The Company, subject to approval of the stockholders at the Meeting, has adopted an amendment to the 1995 Plan to increase the number of shares of Common Stock authorized to be issued to 1,250,000 Shares. The Employees' Stock Option Committee of the Board of Directors is responsible for the administration of the

1995 Plan and has the full authority, subject to the provisions of the plan, to determine to whom and when to grant options and the number of shares of Common Stock covered by each grant. As of February 28, 1998, a total of 709,635 shares are reserved for issuance upon exercise of options granted under the 1995 Plan and 40,365 shares were reserved for exercise upon the future grant of options under the 1995 Plan. No shares have been issued upon the exercise of options under the 1995 Plan.

The 1995 Plan replaced the Company's previous plan maintained for employees under which the Company was authorized to grant non-qualified options. All outstanding options under that plan will remain in effect but no new options will be granted under that plan. As of March 31, 1998, a total of 422,207 shares are reserved for issuance under that plan.

OPTION GRANTS IN LAST FISCAL YEAR

The following table sets forth certain information with respect to options granted to the executive officer named in the Summary Compensation Table in the fiscal year ended December 31, 1997.

	INDIVIDUAL GRANTS			
NAME	NUMBER OF SECURITIES UNDERLYING OPTIONS GRANTED (#)	PERCENT OF TOTAL OPTIONS GRANTED TO EMPLOYEES IN FISCAL YEAR	EXERCISE OF BASE PRICE ($/SH)	EXPIRATIO DATE
Paul K. Willmott	26,280	11%	$7.125	02/10/07
Joe H. Card	15,800	7%	$7.125	02/10/07
Richard F. Clement, Jr.	15,100	6%	$7.125	02/10/07
Richard A. Van Horn	55,000	7%	$5.50	04/01/07
Craig S. Bartels	3,700	2%	$7.125	02/10/07

EXERCISE OF STOCK OPTIONS AND YEAR-END VALUE

The following sets forth information with respect to each exercise of stock options during the fiscal year ended December 31, 1997 and the year-end value of unexercised options held by each of the executive officers named in the Summary Compensation Table.

NAME	SHARES ACQUIRED ON EXERCISE (#)	VALUE REALIZED ($)	NUMBER OF SECURITIES UNDERLYING UNEXERCISE OPTIONS AT FI YEAR END (#)
			EXERCISABL UNEXERCISAB
Paul K. Willmott(1)	--	--	50,000/50,0 50,000/50,0 20,100/20,1 9,418/28,2 0/26,280 14,000/5,0 750/250
Joe H. Card(2)	--	--	1,750/0 3,032/ 3,0 3,360/10,0 0/15,80
Richard F. Clement, Jr.(3)	--	--	24,750/0 13,860/13,8 4,033/12,0 18,750/56,2 0/15,100
Richard A. Van Horn(4)	--	--	0/55,000
Craig S. Bartels(5)	--	--	12,500/37,5 0/ 3,700

** Represents an option whose grant price is above the December 31, 1997 closing price on the NASDAQ-NMS.

(1) Based on the closing price on the NASDAQ-NMS on December 31, 1997 ($3.875) less the grant prices of $4.13, $8.38, $6.88, $9.75, $7.125, $4.25 and $5.88, respectively.

(2) Based on the closing price on the NASDAQ-NMS on December 31, 1997 ($3.875) less the grant prices of $2.94, $6.88, $9.75 and $7.125, respectively.

(3) Based on the closing price on the NASDAQ-NMS on December 31, 1997 ($3.875) less the grant price of $2.94, $6.88, $9.75, $16.13 and $7.125, respectively.

(4) Based on the closing price on the NASDAQ-NMS on December 31, 1997 ($3.875) less the grant price of $5.50.

(5) Based on the closing price on the NASDAQ-NMS on December 31, 1997 ($3.875) less the grant price of $11.13 and $7.125, respectively.

DIRECTOR COMPENSATION

Under the Company's Directors' Stock Option Plan ("Directors' Plan"), each new non-employee director elected or appointed to the Board of Directors for the first time shall be granted an option to purchase 20,000 shares of Common Stock as of the date of such election or appointment and, upon the re-election of a non-employee director at an annual meeting of the Company's stockholders, such director will be granted an option to purchase an additional 1,000 shares as of the date of such election. As of February 28, 1998, a total of 90,000 shares are reserved for issuance upon exercise of options granted under the Directors' Plan and 59,000 shares were reserved for exercise upon the future grant of options under the Directors' Plan. Mr. Erdahl holds options covering 24,000 shares under the Directors' Plan and each of Messrs. Ireland and Tompkins holds options covering 24,000 shares under the Directors' Plan. Mr. Willmott holds options covering 20,000 shares under the Directors' Plan. In addition, Messrs. Ireland, Tompkins and Erdahl each hold options to purchase 100,000 shares of Common Stock. Those options were not granted under the Directors' Plan. On November 17, 1997, the Company entered into agreements with each of its three non-employee directors to amend the terms of these nonqualified stock options such that the expiration date of the option was extended for three years until 2001 and the exercise price was increased by $0.25 per share. Cash compensation for 1997 to the non-employee directors was paid at the rate of $3,000 per quarter plus $1,000 per meeting attended of the Board and committees of the Board.

COMPENSATION COMMITTEE INTERLOCKS AND INSIDER PARTICIPATION

In August 1994, the Company formed a Compensation Committee to determine the compensation of the executive officers and to set the guidelines for compensation for the employees of the Company. During the fiscal year ended December 31, 1997, the Compensation Committee was comprised of Leland O. Erdahl, George R. Ireland and James B. Tompkins. No member of the Compensation Committee has been or was during the fiscal year ended December 31, 1997, an officer or employee of the Company or any of the Company's subsidiaries. In addition, no member of the Compensation Committee during the fiscal year ended December 31, 1997, had any relationship requiring disclosure under the caption "Certain Relationships and Related Transactions." No executive officer of the Company serves or served on the compensation committee of another entity during the fiscal year ended December 31, 1997 and no executive officer of the Company serves or served as a director of another entity who has or had an executive officer serving on the Compensation Committee of the Company.

COMPENSATION AGREEMENTS WITH KEY EXECUTIVES

In June 1997, the Company entered into Compensation Agreements with six of its key executives. Each of these agreement provide that in the event of a change in control of the Company, the executive will have certain rights and benefits for a period of either twenty-four or thirty-six months following such change in control. In particular, the agreements specify that the executive will continue to receive compensation and benefits for the remainder of the applicable period if the Company terminates the executive or if the executive terminates his employment following the occurrence of certain actions without the executive's consent. However, the Company is not obligated to provide such rights and benefits to the executive if the executive was terminated for cause or does not resign as an officer and/or director promptly after receiving written request from the Company to do so.

COMPENSATION COMMITTEE REPORT

Under rules established by the Securities and Exchange Commission, the Company is required to provide certain information regarding the compensation of its Chief Executive Officer and other executive officers whose salary and bonus exceed $100,000 per year. Disclosure requirements include a report explaining the rationale and considerations that lead to fundamental executive compensation decisions. The following report has been prepared to fulfill this requirement.

The Compensation Committee ("Committee") of the Board of Directors sets and administers the policies that govern the annual compensation and long-term compensation of executive officers of the Company. None of the members of the Committee is currently an employee of the Company. The Committee makes all decisions concerning compensation of all executive officers as defined by the Securities and Exchange Commission and all awards of stock options under the Company's 1995 Stock Incentive Plan. The Committee's policy is to offer executive officers competitive compensation packages that will permit the Company to attract and retain highly qualified individuals and to motivate and reward such individuals on the basis of the Company's performance.

At present, the executive compensation package consists of base salary, bonus awards and long-term incentive opportunities in the form of stock options. Executive salaries are reviewed by the Committee on an annual basis and are set for individual executive officers based on subjective evaluations of each individual's performance, the Company's performance and a comparison to base salary ranges for executives in comparable positions at mid-size mining companies in the United States, primarily involved in the mining of precious metals. Within the U.S. uranium mining companies, there are no public companies which the Committee views as comparable in terms of revenues, reserve base and type of operations. Although the mid-size precious metal mining companies are for the most part larger than the Company, the Committee views this group as being comparable to the Company in terms of the administrative, financial and operating skills required of the Company's senior executives. The compensation of the Chief Executive Officer, Mr. Willmott, is determined in the same manner as the compensation of other executive officers as described above. As a result, Mr. Willmott's compensation is largely dependent upon the overall performance of the Company as well as comparison to compensation being paid by comparable companies to their chief executive officers.

Bonuses may be awarded to executive officers and other employees for their performance. The Committee determines the appropriate level of bonuses based upon the Committee's assessment of each person's contributions to the Company's success in terms of income and use of cash, corporate management and increase in shareholder value. With respect to corporate management objectives, objectives included obtaining of projected financings, acquisition of certain potential uranium interests from Santa Fe Pacific Gold Corporation, reduction of unfunded reclamation liabilities, utilization of the matched sale quota, completion of 1997 exploration activities, achievement of budgeted production at budgeted costs, progress in obtaining New Mexico environmental permits, achievement of budgeted overhead reductions, and progress in resolving various legal issues.

Key employees, including executive officers may be granted incentive stock options, pursuant to the Company's Stock Incentive Plan and based upon a review of the Company's performance. Such stock based awards will continue to be an important element of the executive compensation package because they aid in the objective of aligning the officers' interests with those of the stockholders by giving the officers a direct stake in the performance of the Company.

The Committee recognized that the efforts of the Company's key executives have been, and will continue to be substantial. The Committee further recognized that the difficult market conditions have created uncertainties to its key executives. Therefore, the Committee recommended that the Company enter

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into Compensation Agreements with each of the Company's key executives to enable the Company to retain its key executives and to allow such key executives to focus on their operating responsibilities.

Although the Company accomplished a number of its objectives for 1997, due to factors such as production shortfalls, cost overruns and the decrease in demand and consequent decline in price for uranium, the Company's overall performance in the fiscal year ended December 31, 1997 was disappointing. Based on these factors, the Committee recommended that the Company not increase the annual base salary of the Company's senior executives, including the Chief Executive Officer, and not award any cash bonuses. In February 1998, the Committee awarded options totaling 117,000 shares to the Company's senior executives to recognize their efforts on behalf of the Company in a difficult market and for the reasons noted above.

April 16, 1998

MEMBERS OF THE COMPENSATION COMMITTEE

Leland O. Erdahl

George R. Ireland

James B. Tompkins

AMENDMENT TO 1995 STOCK INCENTIVE PLAN
(PROPOSAL 2 ON THE PROXY CARD)

On December 19, 1995, the Company's Stockholders approved the Company's 1995 Stock Incentive Plan (the "Plan") for key employees of the Company. The Plan will enable the Company to provide incentives to employees to perform well in a difficult and rapidly changing environment in the uranium mining industry. The Plan originally authorized grants of incentive stock options and non-qualified options to purchase up to an aggregate of 750,000 shares of Common Stock. As of March 31, 1998, the Company had 38 employees eligible for participation under the Plan, and there were outstanding options to purchase an aggregate of 709,635 shares of Common Stock under the Plan.

The Board of Directors of the Company, subject to the approval of stockholders at the Meeting, has adopted an amendment to the Plan to increase the number of shares of Common Stock authorized to be issued from 750,000 shares to 1,250,000 shares. Approval of the amendment to the Plan will require the affirmative vote of the holders of a majority of the shares of Common Stock, present in person or by proxy at the Meeting. Unless authority is withheld, it is intended that the shares represented by a properly executed proxy will be voted for approval of this amendment.

The essential features of the Plan are outlined below, but such description is qualified in its entirety by reference to the Plan, which is attached hereto as Exhibit A.

TYPES OF AWARDS. Under the Plan, the Company may grant awards of stock options to its key employees and to the key employees of its subsidiaries.

ADMINISTRATION. The Plan is administered by the Compensation Committee of the Board of Directors composed of no fewer than two disinterested members. Subject to the terms of the Plan, the Compensation Committee determines, among other matters, persons to whom awards are granted, type of award granted, number of options granted, vesting schedule, type of consideration to be paid to the Company upon exercise of options and the terms of any option (which cannot exceed ten years). The Compensation Committee may also, in its discretion, issue new options in exchange for the surrender and cancellation of options previously issued under the Plan.

NUMBER OF SHARES. The Company may issue options to purchase an aggregate of 1,250,000 shares of Common Stock under the Plan.

STOCK OPTION TERMS. The Company may grant both incentive stock options ("incentive stock options") intended to qualify under Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"), and options which are not qualified as incentive stock options ("non-qualified options"). Incentive stock options may not be granted at an exercise price less than the fair market value of the Common Stock on the date of grant. The exercise price of incentive stock options granted to holders of more than 10% of the Common Stock must be at least 110% of the fair market value of the Common Stock on the date of grant, and the term of these options cannot exceed five years. The exercise price of non-qualified stock options will be determined by the Compensation Committee on the date of grant but may not be less than 85% of the fair market value of the Common Stock on that date.

Options granted under the Plan are not transferable, otherwise than by will or the laws of descent and distribution, and during the lifetime of the optionholder, options are exercisable only by such optionholder. Stock options granted pursuant to the Plan terminate upon termination of employment, except that in the event of the death or permanent and total disability of the optionholder, the option may be exercised by the holder (or his estate, as the case may be), until the first to occur of the expiration of the option period or the expiration of one year after the date of death or permanent or total disability, and except that upon an employees retirement

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stock options may be extended at the sole discretion of the Compensation Committee for a period of three months following retirement (but in no event beyond the expiration date of the option). The exercise price may be paid in cash, in shares of Common Stock (valued at fair market value at the date of exercise), by delivery of a promissory note or by a combination of such means of payment, as may be determined by the Compensation Committee.

CHANGE IN CONTROL; ADJUSTMENT IN NUMBER OF OPTION SHARES. Upon a Change of Control (as defined in Section 9 of the Plan) of the Company, all stock options granted under the Plan will become exercisable in full. Also, in the event the number of outstanding shares of Common Stock is increased or decreased or changed into or exchanged for a different number or kind of shares of stock or other securities of the Company or of another company, whether as a result of a stock split, stock dividend, combination or exchange of shares, merger or otherwise, each share subject to an unexercised option will be substituted for the number and kind of shares of stock into which each share of outstanding Common Stock is to be changed or for which each such share is to be exchanged and the option price will be increased or decreased proportionately.

FEDERAL INCOME TAX CONSEQUENCES--STOCK OPTIONS. Neither the Company nor the optionee will recognize taxable income or deduction for federal income tax purposes from the grant or exercise of an incentive stock option. When an optionee sells stock acquired upon exercise of an incentive stock option, the optionee will be taxed at long-term capital gain rates if the stock has been held for at least one year and the option was granted at least two years prior to the date of sale ("Holding Period Requirements"). If the optionee fails to meet the Holding Period Requirements, the difference between the exercise price and the fair market value of the stock at the time of exercise will be taxable to the optionee as ordinary income and the Company will be entitled to a deduction equal to the amount of ordinary income recognized by the optionee if the Company complies with applicable withholding requirements and if the amount qualifies as an ordinary and necessary business expense to the Company. Although the optionee will not recognize taxable income for federal income tax purposes upon the exercise of an incentive stock option, the difference between the exercise price and fair market value of the shares at the time of exercise gives rise to an adjustment in calculating alternative minimum taxable income.

Neither the Company nor the optionee will recognize taxable income or deduction from the grant of a non-qualified stock option. At the time of exercise of a non-qualified stock option, the optionee will recognize ordinary income in an amount equal to the difference between the exercise price and the fair market value of the Common Stock. The Company will be entitled to a deduction for tax purposes in an amount equal to the ordinary income recognized by the optionee, if the Company complies with applicable tax withholding requirements.

AMENDMENT OF PLAN. The Board of Directors may at any time and from any time alter, amend, suspend, or discontinue the Plan, except no such action may be taken without stockholder approval which materially increase the benefits to participants under the Plan, materially increases the number of shares to be issued, materially extends the period for granting awards, or materially modifies the requirements as to eligibility. In addition, no such action may be taken which adversely affects the rights of a participant under the Plan without his consent.

VOTE REQUIRED FOR APPROVAL OF THE AMENDMENT TO THE PLAN. Approval of the amendment to the Plan requires the affirmative vote of the holders of a majority of the Common Stock present, or represented, and entitled to vote at the Meeting assuming the presence of a quorum. Each share of Common Stock is entitled to one vote.

Stockholders should note that because employee directors (subject to re-election and stockholder approval) may in the future receive stock options under the Plan, the current employee directors of the Company have a personal interest in the proposal and its approval by stockholders. However, the members of the Board of Directors believe that the amendment is in the best interests of the Company and its stockholders.

STOCK PRICE PERFORMANCE GRAPH

The following graph compares the performance of the Company's Common Stock to the CRSP Total Return Index for The NASDAQ Stock Market (U.S. Companies) and to a self-determined peer group comprised of United States Energy Corp. and Rio Algom Mines, Ltd. for the Company's last five fiscal years. The graph assumes that the value of an investment in the Company's Common Stock and each index was $100 at December 31, 1992, and that all dividends were reinvested.

COMPARISON OF FIVE YEAR CUMULATIVE TOTAL RETURN(1)
1993-1997

Total Returns Index for:	12/31/92	12/31/93	12/31/94	12/31/95
NASDAQ Stock Market (U.S. Companies)(2)	100.0	114.8	112.2	158.7
Self-Determined Peer Group(3)(4)	100.0	128.0	144.7	147.3
Uranium Resources, Inc.(4)	100.0	111.5	187.9	145.1

[GRAPH]

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(1) Total return assumes reinvestment of dividends.
(2) Source: National Association of Securities Dealers, Inc. All dividends are reinvested on the ex-dividend date. The CRSP Total Return Index includes all domestic common shares traded on the NASDAQ National Market and the NASDAQ

Small-Cap Market.

(3) Comprised of United States Energy Corp. and Rio Algom Mines, Ltd.

(4) Source: The Center for Research in Security Prices (affiliated with the University of Chicago Graduate School of Business). All dividends are reinvested on ex-dividend date.

SECTION 16 REPORTING

Section 16(a) of the Securities Exchange Act of 1934, as amended, requires the Company's officers and directors, and persons who own more than 10% of a registered class of the Company's equity securities, to file reports of ownership and changes in ownership with the SEC and the National Association of Securities Dealers, Inc. Officers, directors, and greater than 10% stockholders are required by SEC regulation to furnish the Company with copies of all Section 16(a) filings.

Based solely on its review of copies of such forms received by it and written representations from certain reporting persons that no Forms 5 were required for those persons, the Company believes that, during the year ended December 31, 1997, its officers, directors, and greater than 10% beneficial owners complied with all applicable filing requirements.

PROPOSAL TO RATIFY THE SELECTION OF ARTHUR ANDERSEN, LLP AS AUDITORS (PROPOSAL 3 ON PROXY CARD)

The Board of Directors voted to engage Arthur Andersen, LLP as independent accountants to audit the accounts and financial statements of the Company for the fiscal year ending December 31, 1998, and directed that such engagement be submitted to the stockholders of the Company for ratification. In recommending ratification by the stockholders of such engagement, the Board of Directors is acting upon the recommendation of the Audit Committee, which has satisfied itself as to the firm's professional competence and standing. Although ratification by stockholders of the engagement of Arthur Andersen, LLP is not required by Delaware corporate law or the Company's Restated Certificate of Incorporation or Bylaws, management feels a decision of this nature should be made with the consideration of the Company's stockholders. If stockholder approval is not received, management will reconsider the engagement.

It is expected that one or more representatives of Arthur Andersen, LLP will be present at the Meeting and will be given the opportunity to make a statement if they so desire. It also is expected that the representatives will be available to respond to appropriate questions from the stockholders.

BOARD OF DIRECTORS' RECOMMENDATIONS; VOTE REQUIRED

The Board of Directors unanimously recommends a vote (i) FOR the election as director of each of the nominees named in the proxy; (ii) FOR the approval of the amendment to the 1995 Stock Incentive Plan; and (iii) FOR the ratification of the appointment of Arthur Andersen, LLP as independent auditors.

The affirmative vote of the holders of (i) a plurality of the votes of the outstanding shares of Common Stock present at the Meeting, either in person or represented by proxy, is required to elect each nominee as a director and (ii) a majority of the outstanding shares of Common Stock present at the Meeting, either in person or represented by proxy, is required to approve the amendment to the 1995 Stock Incentive Plan and to ratify the appointment of Arthur Andersen, LLP.

COST AND METHOD OF PROXY SOLICITATION

The accompanying Proxy is being solicited on behalf of the Board of Directors of the Company. All expenses for soliciting Proxies, including the expense of preparing, printing and mailing the form of Proxy and the material used in the solicitation thereof, will be borne by the Company. In addition to the use of the

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mails, Proxies may be solicited by personal interview, telephone and facsimile by directors and regular officers and employees of the Company. Such persons will receive no additional compensation for such services. Arrangements may also be made with brokerage houses and other custodians, nominees and fiduciaries for the forwarding of solicitation material to the beneficial owners of stock held of record by such persons, and the Company may reimburse them for reasonable out-of-pocket expenses incurred by them in connection therewith.

ANNUAL REPORTS AND CONSOLIDATED FINANCIAL STATEMENTS

You are referred to the Company's annual report, including consolidated financial statements, for the year ended December 31, 1997, enclosed herewith for your information. The annual report is not incorporated in this Proxy Statement and is not to be considered part of the soliciting material.

DEADLINE FOR RECEIPT OF STOCKHOLDER PROPOSALS FOR 1999 ANNUAL MEETING

Any proposals that stockholders of the Company desire to have presented at the 1999 Annual Meeting of Stockholders must be received by the Company at its principal executive offices no later than December 31, 1998.

UNDERTAKING TO PROVIDE DOCUMENTS

THE COMPANY WILL PROVIDE TO EACH PERSON TO WHOM A COPY OF THIS PROXY STATEMENT IS DELIVERED, UPON THE WRITTEN OR ORAL REQUEST OF ANY SUCH PERSON AND WITHOUT CHARGE, A COPY OF THE COMPANY'S ANNUAL REPORT ON FORM 10-K FOR THE YEAR ENDED DECEMBER 31, 1997 AND UPON THE PAYMENT OF A REASONABLE FEE WHICH SHALL BE LIMITED TO THE COMPANY'S REASONABLE EXPENSES, A COPY OF ANY EXHIBIT TO SUCH ANNUAL REPORT ON FORM 10-K. WRITTEN REQUESTS FOR SUCH COPIES SHOULD BE DIRECTED TO THOMAS H. EHRLICH, URANIUM RESOURCES, INC., 12750 MERIT DRIVE, SUITE 1020, LB 12, DALLAS, TEXAS 75251, (972) 387-7777.

MISCELLANEOUS

The Board of Directors is not aware of any matter, other than the matters described above, to be presented for action at the Meeting. However, if any other business properly comes before the Meeting, the person or persons named in the enclosed form of proxy will vote the proxy in accordance with his or their best judgment on such matters.

DALLAS, TEXAS

April 27, 1998

EXHIBIT A

URANIUM RESOURCES, INC.
1995 STOCK INCENTIVE PLAN

1. General. This Stock Incentive Plan (the "Plan") provides eligible employees of Uranium Resources, Inc., (the "Company") with the opportunity to acquire or expand their equity interest in the Company by making available for purchase Common Shares, par value $.001 per share, of the Company ("Common Shares"), through the granting of nontransferable options to purchase Common Shares ("Stock Options"). It is intended that key employees may be granted, simultaneously or from time to time, Stock Options that qualify as incentive stock options ("Incentive Stock Options") under Section 422 of the Internal Revenue Code of 1986, as amended (the "Code") or Stock Options that do not so qualify ("Non-qualified Stock Options"). No provision of the Plan is intended or shall be construed to grant employees alternative rights in any Incentive Stock Option granted under the Plan so as to prevent such Option from qualifying under Section 422 of the Code.

2. Purpose of the Plan. The purpose of the Plan is to provide continuing incentives to key employees of the Company and of any subsidiary corporation of the Company, by encouraging such key employees to acquire new or additional share ownership in the Company, thereby increasing their proprietary interest in the Company's business and enhancing their personal interest in the Company's success.

For purposes of the Plan, a "subsidiary corporation" consists of any corporation at least fifty percent (50%) of the stock of which is directly or indirectly owned or controlled by the Company.

3. Effective Date of the Plan. The Plan shall become effective upon its adoption by the Board of Directors, subject to approval by holders of a majority of the outstanding shares of voting capital stock of the Company. If the Plan is not so approved within twelve (12) months after the date the Plan is adopted by the Board of Directors, the Plan and any grants made hereunder shall be null and void. However, if the Plan is so approved, no further shareholder approval shall be required with respect to the making of grants pursuant to the Plan, except as provided in Section 10 hereof.

4. Administration of the Plan. The Plan shall be administered by the Compensation Committee of the Board of Directors of the Company, or by any other committee selected by such Board of Directors by majority vote and composed of no fewer than two (2) members of such Board of Directors (the "Committee"). No person shall be appointed to the Committee who, during the one-year period immediately preceding such person's appointment to the Committee, has received any grants of Stock Options under the Plan or any similar stock option or stock incentive plan, other than a formula-based plan, maintained by the Company or any subsidiary corporation. A member of the Committee shall not be eligible to participate in this Plan while serving on the Committee.

A majority of the Committee shall constitute a quorum. The acts of a majority of the members present at any meeting at which a quorum is present (or acts unanimously approved in writing by the members of the Committee) shall constitute binding acts of the Committee.

Subject to the terms and conditions of the Plan, the Committee shall be authorized and empowered:

(a) To select the key employees to whom grants may be made;

(b) To determine the number of Common Shares to be covered by any Grant;

(c) To prescribe the terms and conditions of any grants made under the Plan, and the form(s) and agreement(s) used in connection with such grants, which shall include agreements governing the granting of Stock Options;

(d) To determine the time or times when Stock Options will be granted and when they will terminate in whole or in part;

(e) To determine the time or times when Stock Options that are granted may be exercised;

(f) To determine whether new options can be issued in exchange for the surrender and cancellation of options previously issued under the Plan;

(g) To determine, at the time a Stock Option is granted under the Plan, whether such Option is an Incentive Stock Option entitled to the benefits of Section 422 of the Code; and

(h) To establish any other Stock Option agreement provisions not inconsistent with the terms and conditions of the Plan or, where the Stock Option is an Incentive Stock Option, with the terms and conditions of Section 422 of the Code.

5. Employees Eligible for Grants. Grants may be made from time to time to those key employees of the Company or a subsidiary corporation, who are designated by the Committee in its sole and exclusive discretion. Key employees may include, but shall not necessarily be limited to, members of the Board of Directors (excluding members of the Committee), and officers, of the Company and any subsidiary corporation; however, Stock Options intended to qualify as Incentive Stock Options shall only be granted to key employees while actually employed by the Company or a subsidiary corporation. The Committee may grant more than one Stock Option to the same key employee. No Stock Option shall be granted to any key employee during any period of time when such key employee is on a leave of absence.

6. Shares Subject to the Plan. The shares to be issued pursuant to any Stock Option granted under the Plan shall be Common Shares. Either Common Shares held as treasury stock, or authorized and unissued Common Shares, or both, may be so issued, in such amount or amounts within the maximum limits of the Plan as the Board of Directors shall from time to time determine.

Subject to the provisions of the next succeeding paragraph of this Section 6 and the provisions of Section 7(h), the aggregate number of Common Shares that can be actually issued under the Plan shall be one million, two hundred and fifty thousand (1,250,000) Common Shares.

If, at any time subsequent to the date of adoption of the Plan by the Board of Directors, the number of Common Shares are increased or decreased, or changed into or exchanged for a different number or kind of shares of stock or other securities of the Company or of another corporation (whether as a result of a stock split, stock dividend, combination or exchange of shares, exchange for other securities, reclassification, reorganization, redesignation, merger, consolidation, recapitalization or otherwise): (i) there shall automatically be substituted for each Common Share subject to an unexercised Stock Option (in whole or in part) granted under the Plan, the number and kind of shares of stock or other securities into which each outstanding Common Share shall be changed or for which each such Common Share shall be exchanged; and (ii) the option price per Common Share or unit of securities shall be increased or decreased proportionately so that the aggregate purchase price for the securities subject to a Stock Option shall remain the same as immediately prior to such event. In addition to the foregoing, the Committee shall be entitled in the event of any such increase, decrease or exchange of Common Shares to make other adjustments to the securities subject to a Stock Option, the provisions of the Plan, and to any related Stock Option agreements (including adjustments which may provide for the elimination of fractional shares), where necessary to preserve the terms and conditions of any grants hereunder.

7. Stock Option Provisions.

(a) General. The Committee may grant to key employees (also referred to as "optionees") nontransferable Stock Options that either qualify as Incentive Stock Options under Section 422 of the Code or do not so qualify. However, any Stock Option which is an Incentive Stock Option shall only be granted within 10 years from the earlier of (i) the date this Plan is adopted by the Board of Directors of the Company; or (ii) the date this Plan is approved by the shareholders of the Company.

(b) Stock Option Price. The option price per Common Share which may be purchased under an Incentive Stock Option under the Plan shall be determined by the Committee at the time of Grant, but shall not be less than one hundred percent (100%) of the fair market value of a Common Share, determined as of the date such Option is granted; however, if a key employee to whom an Incentive Stock Option is granted is, at the time of the grant of such Option, an "owner," as defined in Section 422(b)(6) of the Code (modified as provided in Section 424(d) of the Code) of more than ten percent (10%) of the total combined voting power of all classes of stock of the Company or any subsidiary corporation (a "Substantial Shareholder"), the price per Common Share of such Option, as determined by the Committee, shall not be less than one hundred ten percent (110%) of the fair market value of a Common Share on the date such Option is granted. The option price per Common Share under each Stock Option granted pursuant to the Plan which is not an Incentive Stock Option shall be determined by the Committee at the time of Grant. Except as specifically provided above, the fair market value of a Common Share shall be determined in accordance with procedures to be established by the Committee. The day on which the Committee approves the granting of a Stock Option shall be considered the date on which such Option is granted.

(c) Period of Stock Option. The Committee shall determine when each Stock Option is to expire. However, no Stock Option shall be exercisable for a period of more than ten (10) years from the date upon which such Option is granted. Further, no Incentive Stock Option granted to an employee who is a Substantial Shareholder at the time of the grant of such Option shall be exercisable after the expiration of (5) years from the date of grant of such Option.

(d) Limitation on Exercise and Transfer of Stock Options. Only the key employee to whom a Stock Option is granted may exercise such Option, except where a guardian or other legal representative has been duly appointed for such employee, and except as otherwise provided in the case of such employee's death. No Stock Option granted hereunder shall be transferable by an optionee other than by will or the laws of descent and distribution. No Stock Option granted hereunder may be pledged or hypothecated, nor shall any such Option be subject to execution, attachment or similar process.

(e) Employment, Holding Period Requirements For Certain Options. The Committee may condition any Stock Option granted hereunder upon the continued employment of the optionee by the Company or by a subsidiary corporation, and may make any such Stock Option immediately exercisable. However, the Committee will require that, from and after the date of grant of any Incentive Stock Option granted hereunder until the day three (3) months prior to the date such Option is exercised, such optionee must be an employee of the Company or of a subsidiary corporation, but always subject to the right of the Company or any such subsidiary corporation to terminate such optionee's employment during such period. Each Stock Option shall be subject to such additional restrictions as to the time and method of exercise as shall be prescribed by the Committee. Upon completion of such requirements, if any, a Stock Option or the appropriate portion thereof may be exercised in whole or in part from time to time during the option period; however, such exercise right(s) shall be limited to whole shares.

(f) Payment for Stock Option Price. A Stock Option shall be exercised by an optionee giving written notice to the Company of his intention to exercise the same, accompanied by full payment of the purchase price in cash or by check, or, with the consent of the Committee, in whole or in part with a promissory note or with a surrender of Common Shares having a fair market value on the date of exercise equal to that portion of the purchase price for which payment in cash or check is not made. The Committee may, in its sole discretion, approve other methods of exercise for a Stock Option or payment of the option price, provided that no such method shall cause any option granted under the Plan as an Incentive Stock Option to not qualify under Section 422 of the Code, or cause any Common Share issued in connection with the exercise of an option not to be a fully paid and non-assessable Common Share.

(g) Certain Reissuances of Stock Options. To the extent Common Shares are surrendered by an optionee in connection with the exercise of a Stock Option in accordance with Section 7(f), the Committee may in its sole discretion grant new Stock Options to such optionee (to the extent Common Shares remain available for grants), subject to the following terms and conditions:

(i) The number of Common Shares shall be equal to the number of Common Shares being surrendered by the optionee;

(ii) The option price per Common Share shall be equal to the fair market value of Common Shares, determined on the date of exercise of the Stock Options whose exercise caused such Grant; and

(iii) The terms and conditions of such Stock Options shall in all other respects replicate such terms and conditions of the Stock Options whose exercise caused such Grant, except to the extent such terms and conditions are determined to not be wholly consistent with the general provisions of this Section 7, or in conflict with the remaining provisions of this Plan.

(h) Cancellation and Replacement of Stock Options and Related Rights. The Committee may at any time or from time to time permit the voluntary surrender by an optionee who is the holder of any outstanding Stock Options under the Plan, where such surrender is conditioned upon the granting to such optionee of new Stock Options for such number of shares as the Committee shall determine, or may require such a voluntary surrender as a condition precedent to the grant of new Stock Options. The Committee shall determine the terms and conditions of new Stock Options, including the prices at and periods during which they may be exercised, in accordance with the provisions of this Plan, all or any of which may differ from the terms and conditions of the Stock Options surrendered. Any such new Stock Options shall be subject to all the relevant provisions of this Plan. The Common Shares subject to any Stock Option so surrendered, shall no longer be charged against the limitation provided in Section 6 of this Plan and may again become shares subject to the Plan. The granting of new Stock Options in connection with the surrender of outstanding Stock Options under this Plan shall be considered for the purposes of the Plan as the granting of new Stock Options and not an alteration, amendment or modification of the Plan or of the Stock Options being surrendered.

(i) Limitation on Exercisable Incentive Stock Options. The aggregate fair market value of the Common Shares first becoming subject to exercise as Incentive Stock Options by a key employee during any given calendar year shall not exceed the sum of One Hundred Thousand Dollars ($100,000). Such aggregate fair market value shall be determined as of the date such Option is granted, taking into account, in the order in which granted, any other incentive stock options granted by the Company, or by a parent or subsidiary thereof.

8. Termination of Employment. If a key employee ceases to be an employee of the Company and every subsidiary corporation, for a reason other than death, retirement, or permanent and total disability, his Stock Options shall, unless extended by the Committee on or before his date of termination of employment,

terminate on the effective date of such termination of employment. Neither the key employee nor any other person shall have any right after such date to exercise all or any part of his Stock Options.

If termination of employment is due to death or permanent and total disability, then outstanding Stock Options may be exercised within the one (1) year period ending on the anniversary of such death or permanent and total disability. In the case of death, such outstanding Stock Options shall be exercised by such key employee's estate, or the person designated by such key employee by will, or as otherwise designated by the laws of descent and distribution. Notwithstanding the foregoing, in no event shall any Stock Option be exercisable after the expiration of the option period, and in the case of exercises made after a key employee's death, not to any greater extent than the key employee would have been entitled to exercise such Option at the time of his death.

Subject to the discretion of the Committee, in the event a key employee terminates employment with the Company and all subsidiary corporations because of normal or early retirement, any then-outstanding Stock Options held by such key employee shall lapse at the earlier of the end of the term of such Stock Option or three (3) months after such retirement or permanent and total disability.

In the event an employee of the Company or one of its subsidiary corporations is granted a leave of absence by the Company or such subsidiary corporation to enter military service or because of sickness, his employment with the Company or such subsidiary corporation shall not be considered terminated, and he shall be deemed an employee of the Company or such subsidiary corporation during such leave of absence or any extension thereof granted by the Company or such subsidiary corporation.

9. Change of Control. Upon the occurrence of a Change of Control (as defined below), notwithstanding any other provisions hereof or of any agreement to the contrary, all Stock Options granted under this Plan shall become immediately exercisable in full.

For purposes of this Plan, a Change of Control shall be deemed to have occurred if: (i) a tender offer shall be made and consummated for the ownership of 25% or more of the outstanding voting securities of the Company; (ii) the Company shall be merged or consolidated with another corporation and, as a result of such merger or consolidation, less than 75% of the outstanding voting securities of the surviving or resulting corporation shall be owned in the aggregate by the former shareholders of the Company as the same shall have existed immediately prior to such merger or consolidation; or (iii) the Company shall sell substantially all of its assets to another corporation which is not a wholly owned subsidiary; or (iv) a person, within the meaning of Section 3(a)(9) or of Section 13(d)(3) (as in effect on the date hereof) of the Exchange Act, shall acquire, other than by reason of inheritance, fifty-one percent (51%) or more of the outstanding voting securities of the Company (whether directly, indirectly, beneficially or of record). In making any such determination, transfers made by a person to an affiliate of such person (as determined by the Board of Directors of the Company), whether by gift, devise or otherwise, shall not be taken into account. For purposes of this Plan, ownership of voting securities shall take into account and shall include ownership as determined by applying the provisions of Rule 13d-3(d)(1)(i) as in effect on the date hereof pursuant to the Exchange Act.

Notwithstanding the provisions of subparagraph (iv) of this Section 9, "person" is used in that subparagraph shall not include any holder who was the beneficial owner of more than ten percent (10%) of the voting securities of the Company on the date the Plan was adopted by the Board of Directors.

10. Amendments to Plan. The Committee is authorized to interpret this Plan and from time to time adopt any rules and regulations for carrying out this

Plan that it may deem advisable. Subject to the approval of the Board of Directors of the Company, the Committee may at any time amend, modify, suspend or terminate this Plan. In no event, however, without the approval of shareholders, shall any action of the Committee or the Board of Directors result in:

(a) Materially amending, modifying or altering the eligibility requirements provided in Section 5 hereof; or

(b) Materially increasing, except as provided in Section 6 hereof, the maximum number of shares subject to Stock Options; except to conform this Plan and any agreements made hereunder to changes in the Code or governing law.

11. Investment Representation, Approvals and Listing. The Committee may, if it deems appropriate, condition its grant of any Stock Option hereunder upon receipt of the following investment representation from the optionee:

> "I agree that any Common Shares of Uranium Resources, Inc., which I may acquire by virtue of this Stock Option shall be acquired for investment purposes only and not with a view to distribution or resale, and may not be transferred, sold, assigned, pledged, hypothecated or otherwise disposed of by me unless (i) a registration statement or post-effective amendment to a registration statement under the Securities Act of 1933, as amended, with respect to said Common Shares has become effective so as to permit the sale or other disposition of said shares by me; or (ii) there is presented to Uranium Resources, Inc., an opinion of counsel satisfactory to Uranium Resources, Inc., to the effect that the sale or other proposed disposition of said Common Shares by me may lawfully be made otherwise than pursuant to an effective registration statement or post-effective amendment to a registration statement relating to the said shares under the Securities Act of 1933, as amended."

The Company shall not be required to issue any certificate or certificates for Common Shares upon the exercise of any Stock Option granted under this Plan prior to (i) the obtaining of any approval from any governmental agency which the Committee shall, in its sole discretion, determine to be necessary or advisable; (ii) the admission of such shares to listing on any national securities exchange on which the Common Shares may be listed; (iii) the completion of any registration or other qualifications of the Common Shares under any state or federal law or ruling or regulations of any governmental body which the Committee shall, in its sole discretion, determine to be necessary or advisable or the determination by the Committee, in its sole discretion, that any registration or other qualification of the Common Shares is not necessary or advisable; and (iv) the obtaining of an investment representation from the optionee in the form stated above or in such other form as the Committee, in its sole discretion, shall determine to be adequate.

12. General Provisions. The form and substance of Stock Option agreements made hereunder, whether granted at the same or different times, need not be identical. Nothing in this Plan or in any agreement shall confer upon any employee any right to continue in the employ of the Company or any of its subsidiary corporations, to be entitled to any remuneration or benefits not set forth in this Plan or such Grant, or to interfere with or limit the right of the Company or any subsidiary corporation to terminate his employment at any time, with or without cause. Nothing contained in this Plan or in any Stock Option agreement shall be construed as entitling any optionee to any rights of a shareholder as a result of the grant of a Stock Option, until such time as Common Shares are actually issued to such optionee pursuant to the exercise of such Option. This Plan may be assumed by the successors and assigns of the Company. The liability of the Company under this Plan and any sale made hereunder is limited to the obligations set forth herein with respect to such

sale and no term or provision of this Plan shall be construed to impose any liability on the Company in favor of any employee with respect to any loss, cost or expense which the employee may incur in connection with or arising out of any transaction in connection with this Plan. The cash proceeds received by the Company from the issuance of Common Shares pursuant to this Plan will be used for general corporate purposes. The expense of administering this Plan shall be borne by the Company. The captions and section numbers appearing in this Plan are inserted only as a matter of convenience. They do not define, limit, construe or describe the scope or intent of the provisions of this Plan.

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13. Termination of This Plan. This Plan shall terminate on October 11, 2005, and thereafter no Stock Options shall be granted hereunder. All Stock Options outstanding at the time of termination of this Plan shall continue in full force and effect according to their terms and the terms and conditions of this Plan.

URANIUM RESOURCES, INC.

PROXY FOR ANNUAL MEETING OF STOCKHOLDERS
TO BE HELD ON JUNE 5, 1998

THIS PROXY IS SOLICITED ON BEHALF OF THE BOARD OF DIRECTORS

The undersigned stockholder of Uranium Resources, Inc. (the "Company") hereby constitutes and appoints Paul K. Willmott, George R. Ireland, James B. Tompkins and Leland O. Erdahl, or any of them acting singly, each with the power of substitution as attorneys and proxies to vote all of the shares which the undersigned is entitled to vote at the Annual Meeting of Stockholders of the Company to be held at the Landmark Club, 12740 Merit Drive, Dallas, Texas, 75251 on Friday, June 5, 1998, at 9:00 a.m., local time, and at any and all adjournments thereof, with the same force and effect as if the undersigned were personally present, and the undersigned hereby instructs the above-named Attorneys and Proxies to vote as follows:

1. ELECTION OF DIRECTORS. The following four persons have been nominated to serve on the Company's Board of Directors: Paul K. Willmott, George R. Ireland, James B. Tompkins and Leland O. Erdahl.

[ ] FOR all nominees listed above [ ] WITHHOLD AUTHORITY to vote for all nominees listed above

(INSTRUCTION: TO WITHHOLD AUTHORITY TO VOTE FOR ANY ONE OR MORE INDIVIDUAL NOMINEES, WRITE THE NAME OF EACH SUCH NOMINEE IN THE SPACE PROVIDED BELOW.)

Withhold authority to vote for any individual nominee
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2. APPROVAL OF AMENDMENT TO 1995 STOCK INCENTIVE PLAN. Proposal to approve the amendment of the 1995 Stock Incentive Plan to increase the number of shares of Common Stock which may be issued upon the exercise of options under the Plan from 750,000 shares to 1,250,000 shares:

[ ] FOR [ ] AGAINST [ ] ABSTAIN

sale and no term or provision of this Plan shall be construed to impose any liability on the Company in favor of any employee with respect to any loss, cost or expense which the employee may incur in connection with or arising out of any transaction in connection with this Plan. The cash proceeds received by the Company from the issuance of Common Shares pursuant to this Plan will be used for general corporate purposes. The expense of administering this Plan shall be borne by the Company. The captions and section numbers appearing in this Plan are inserted only as a matter of convenience. They do not define, limit, construe or describe the scope or intent of the provisions of this Plan.

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1. ELECTION OF DIRECTORS. The following four persons have been nominated to serve on the Company's Board of Directors: Paul K. Willmott, George R. Ireland, James B. Tompkins and Leland O. Erdahl.

[ ] FOR all nominees listed above   [ ] WITHHOLD AUTHORITY to vote for all nominees listed above

(INSTRUCTION: TO WITHHOLD AUTHORITY TO VOTE FOR ANY ONE OR MORE INDIVIDUAL NOMINEES, WRITE THE NAME OF EACH SUCH NOMINEE IN THE SPACE PROVIDED BELOW.)

Withhold authority to vote for any individual nominee
----

2. APPROVAL OF AMENDMENT TO 1995 STOCK INCENTIVE PLAN. Proposal to approve the amendment of the 1995 Stock Incentive Plan to increase the number of shares of Common Stock which may be issued upon the exercise of options under the Plan from 750,000 shares to 1,250,000 shares:

[ ] FOR   [ ] AGAINST   [ ] ABSTAIN

3. RATIFICATION OF ARTHUR ANDERSEN, LLP. Proposal to ratify the selection of Arthur Andersen, LLP, independent accountants, as the independent auditors of the Company for the fiscal year ending December 31, 1998:

[ ] FOR [ ] AGAINST [ ] ABSTAIN

4. OTHER BUSINESS. In their discretion, the proxies are authorized to vote upon such other business as may properly come before the Meeting or any adjournment of adjournments thereof.

THIS PROXY, WHEN PROPERLY EXECUTED, WILL BE VOTED IN THE MANNER DIRECTED HEREIN BY THE UNDERSIGNED STOCKHOLDER. IF NO DIRECTION IS MADE, THIS PROXY WILL BE VOTED FOR THE NOMINEES SET FORTH IN PROPOSAL 1, FOR PROPOSAL 2 AND FOR PROPOSAL 3.

DATED: ---------------------, 1998

(Signature)

(Signature)

NOTE: PLEASE SIGN EXACTLY AS YOUR NAME OR NAMES APPEAR ON THIS CARD. JOINT OWNERS SHOULD EACH SIGN PERSONALLY. WHEN SIGNING AS ATTORNEY, EXECUTOR, ADMINISTRATOR, PERSONAL REPRESENTATIVE, TRUSTEE OR GUARDIAN, PLEASE GIVE YOUR FULL TITLE AS SUCH. FOR A CORPORATION OR A PARTNERSHIP, PLEASE SIGN IN THE FULL CORPORATE NAME BY THE PRESIDENT OR OTHER AUTHORIZED OFFICER OR THE FULL PARTNERSHIP NAME BY AN AUTHORIZED PERSON, AS THE CASE MAY BE. (PLEASE MARK, SIGN, DATE, AND RETURN THIS PROXY IN THE ENCLOSED ENVELOPE.)

Page 2

AUG 28 1995
R. BARTON, CLERK
DISTRICT COURT, DUVAL COUNTY TEXAS
BY: ____________ DEPUTY

CAUSE NO. 16264

MANUEL T. LONGORIA, individually and as trustee for MARIA A. LONGORIA GST EXEMPT TRUST	§	IN THE DISTRICT COURT
vs.	§	DUVAL COUNTY, TEXAS
URANIUM RESOURCES, INC., URI, INC., and WILLIAM M. MCKNIGHT, SR.	§	229TH JUDICIAL DISTRICT

PLAINTIFF'S ORIGINAL PETITION

TO THE HONORABLE JUDGE OF SAID JUDGE:

MANUEL T. LONGORIA, individually and as trustee for MARIA A. LONGORIA GST EXEMPT TRUST, files his Original Petition complaining of URANIUM RESOURCES, INC., URI, INC., and WILLIAM M. MCKNIGHT, and would show the Court as follows:

I.

MANUEL T. LONGORIA, (hereinafter referred to as "Plaintiff), is a natural person residing at 1408 Mier, Laredo, Webb County, Texas 78040. He is the sole Trustee for the MARIA A. LONGORIA GST EXEMPT TRUST. Said Plaintiff owns the property , both individually and as Trustee, made subject to this suit.

Defendant URANIUM RESOURCES, INC., is a Delaware corporation with its principal place of business in Dallas, Dallas County, Texas. URANIUM RESOURCES, INC. may be served with process through Thomas Ehrlich, 12750 Merit Drive, Suite 1210, Lock Box 12, Dallas, Dallas County, Texas 75251.

Defendant URI, INC., is a Delaware corporation with its principal place in Dallas, Dallas County, Texas. URI, INC. is a wholly-owned subsidiary of URANIUM RESOURCES, INC. URI, INC. may also be served with process through Thomas Ehrlich, 12750 Merit Drive, Suite 1210, Lock Box 12, Dallas, Dallas County, Texas 75251.

Defendant, WILLIAM M. MCKNIGHT, SR., is a natural person, resident of Nueces County, Texas, who may be served with process at URI, INC., 5656 South Staples, Suite 250, LB 8, Corpus Christi, Texas 78411.

II.

Venue is proper in Duval County pursuant to Tex. Civ. Prac & Rem. Code § 15.001 because all or part of Plaintiff's causes of action accrued in Duval County.

III.

Defendants, URANIUM RESOURCES, INC. and URI, INC., for many years engaged in uranium mining and processing operations on ranch property owned by Plaintiff, pursuant to a mineral lease with Plaintiff, as well as on property immediately adjacent to Plaintiff's land. As a result of these uranium mining and processing operations, URANIUM RESOURCES, INC. and URI, INC., have, on many occasions, released toxic chemicals and/or radioactive materials onto Plaintiff's land polluting the soil, aquifer, and vegetation of Plaintiff's Ranch, in violation of Texas law and said Defendants' contractual obligations to Plaintiff.

IV.

Plaintiff would further aver that Defendant WILLIAM R. MCKNIGHT in the events giving rise to this suit, is a person who had supervisory and management authority over the uranium operations in question, including such a degree of control that would have enabled him, in the exercise of ordinary care, to properly protect the Plaintiff from the injuries and damages suffered by Plaintiff in the events giving rise to this suit.

Plaintiff would assert and allege that the cause or causes of action herein arose from or are connected with purposeful acts committed by said Defendant.

V.

Plaintiff MANUEL T. LONGORIA is the owner and trustee of the property which is the subject of this suit. The property is a ranch located in Duval and Webb Counties. In the late 1970's Plaintiff leased the rights to mine for uranium on portions of his Ranch to Defendants, URANIUM RESOURCES, INC., AND URI, INC., who thereafter engaged in uranium mining and processing operation on Plaintiff's land at all times relevant herein. During the course of said Defendants' Uranium mining and processing operations on Plaintiff's Ranch, and on adjacent land, Defendants URANIUM RESOURCES, INC. and URI, INC. (hereinafter collectively referred to as "URI"), wrongfully discharged excessive and hazardous materials onto Plaintiff's property, contaminating the soils, aquifer, and vegetation on his Ranch, and creating a serious health hazard thereon. Despite the Defendants' knowledge that URI's activities were contaminating Plaintiff's property, they completely failed to inform Plaintiff of the pollution, and instead constantly assured him that URI's activities were doing no harm. Plaintiff did not learn of the pollution and contamination of his property until only recently. The contamination has damaged the value of the property, preventing Plaintiff's use and enjoyment of the property, and has become a substantial toxic health hazard.

VI.

URI's Uranium mining and processing operations on Plaintiff's Ranch (hereinafter referred to as the "Longoria Ranch"), and the adjacent property, first began in 1979. URI mined the Uranium through in-situ solution mining, a process which contaminated the soil, aquifer, and vegetation on Plaintiff's land with toxic materials and hazardous waste.

VII.

URI also discharged massive amounts of wastewater into the Arroyo de los Angeles in its uranium mining and processing operations, both on the Longoria Ranch and on adjacent property, including discharging directly into an extremely rare and attractive natural spring fed pool in the Arroyo that was used for swimming and fishing. As a result, portions of property owned by Plaintiff, including the Arroyo spring, and the Arroyo meadows, is contaminated with hazardous materials and hazardous waste.

VIII.

Defendant MCKNIGHT represented to Plaintiffs that the discharge onto the Arroyo de Los Angeles from URI's mining operations would consist of water cleaner than typical City drinking water, and convinced Plaintiff to allow for such discharge, when said Defendant knew that in fact the Arroyo would be contaminated with massive amounts of wastewater laden with hazardous materials.

IX.

The Arroyo de los Angeles on the Longoria Ranch property in Duval County is now polluted with dangerous chemicals. These chemicals were deposited by discharges onto the Arroyo. Such contamination was caused by URI and has damaged the value of Plaintiff's property, prevented use of the property, and has created a serious health hazard which has resulted in the need for extensive remediation of the affected soil, aquifer, and vegetation.

X.

Other property on the Longoria Ranch, including the uranium mine fields operated by URI, and property on which URI's uranium processing facilities were located, were contaminated with hazardous materials and dangerous chemicals as a result of the uranium mining activities of URI. Such contamination was caused by URI and has damaged the value and use of Plaintiff's property, and has created a serious health hazard which has resulted in the need for extensive remediation of the affected soil, aquifer, and vegetation.

XI.

Following the cessation of its solution mining operations at the Longoria Ranch, URI was asked by the State to clean-up its pollution. Plaintiff subsequently also requested of URI that it remediate the property. URI has failed to comply.

XII.
NEGLIGENCE
AND GROSS NEGLIGENCE

Defendants owed a duty of reasonable care to Plaintiff to ensure that its activities on Plaintiff's property did not injure or damage Plaintiff. Defendants breached this duty of care through acts and omissions including but not limited to:

1. Failing to adequately and safely conduct mining operations;
2. Failing to adequately and safely conduct uranium processing operations;
3. Failing to adequately and properly conduct mining restoration activities;
4. Failing to dispose of wastewater in an adequate and proper manner;
5. Failing to choose a safe and adequate location for its wastewater discharge;
6. Failing to conduct accurate, timely and frequent testing of chemicals in its wastewater stream;
7. Failing to conduct accurate, timely and frequent testing of chemicals in the soil at its wastewater discharge locations;
8. Failing to properly investigate and take appropriate action when notified of contamination by the State;
9. Misinforming the Plaintiff and the public of the scope and nature of contamination on the Longoria Ranch;
10. Failing to take timely and appropriate actions to clean-up the contamination on the Longoria Ranch;
11. Failing to comply with the State of Texas regulations regarding limits for chemical contamination of soil and water;
12. Failing to comply with State of Texas regulations regarding the frequency of testing for chemicals in its wastestream, and in the soil;
13. Failing to take adequate corrective measures when it

knew or should have known that its activities were polluting and contaminating Plaintiff's property;

14. Failing to warn Plaintiff of the potential contamination of his property;

15. Failing to notify Plaintiff of the contamination of his property.

Defendants' negligent acts and omissions were and are a proximate cause of injuries and damages to Plaintiff.

XIII.
NEGLIGENCE PER SE

URI's wastewater disposal caused contamination and pollution of Plaintiff's property in excess of the pollution threshold limits defined in Texas law.

XIV.
BREACH OF CONTRACT

Plaintiff entered into a Uranium mining lease with R.L. Burns Corp. on August 10, 1977. This lease was subsequently assigned by R.L. Burns Corp. to URI. URI breached the lease through its improper, inadequate, and unsafe conduct in its uranium mining and processing operations, including the disposal of polluted wastewater onto the Longoria Ranch which contaminated Plaintiff's soil, aquifer, and vegetation with toxic and radioactive materials, and other unsafe uranium mining and processing activities, all of which contaminated Plaintiff's land; and further breached the lease in failing to remediate Plaintiff's contaminated land to its original condition. Furthermore, URI has failed to pay any compensation whatsoever to Plaintiff for the damage to his property. URI's breaches of its agreements with Plaintiff have damaged and injured Plaintiff beyond the jurisdictional limits of the Court.

XV.
FRAUD

Prior to entering into the original Uranium lease with Plaintiff, as well as the subsequent wastewater pipeline easement agreement, URI and MCKNIGHT made false material representations to Plaintiff regarding the environmental impact of URI's operations on Plaintiff's property. URI and MCKNIGHT told Plaintiff that its operations were clean, safe, and well-regulated and would not affect Plaintiff's property or its value. When URI and MCKNIGHT made these representations, they knew they were false, or in the alternative, made them recklessly without any knowledge of their truth as a positive assertion. URI and MCKNIGHT made false representations with the full intent that Plaintiff rely upon them in order to encourage Plaintiff to enter into a Uranium mining lease with URI and to allow URI and MCKNIGHT to discharge wastewater into the Arroyo de Los Angeles. Based upon URI's and MCKNIGHT'S representations that its activities would not contaminate or pollute his land, Plaintiff entered into the lease with URI and allowed the discharge of waste water into the Arroyo, through a pipeline easement, and has thereby suffered substantial and severe injuries and damages.

XVI.
NUISANCE

URI's pollution and contamination of the soil, aquifer, and vegetation of Plaintiff's ranch has unreasonably interfered with

Plaintiff's use and enjoyment of his land. URI's conduct was a result of its intentional or negligent wrongdoing. Such wrongdoing as plead elsewhere in this petition is incorporated into this section by reference. URI's interference with Plaintiff's use and enjoyment of his land has caused Plaintiff significant and substantial harm.

XVII.
TRESPASS

URI's dumping of toxic and radioactive materials on Plaintiff's property through its wastewater discharge constituted an unauthorized physical entry on the property. It was URI's full intention to dispose of the wastewater on Plaintiff's property, and such disposal was done voluntarily. As a result of the unauthorized entry of URI's toxic materials on his ranch, Plaintiff has suffered significant and substantial injuries and damages.

XVIII.
INTENTIONAL INFLICTION OF EMOTIONAL DISTRESS

URI's pollution of Plaintiff's property, its efforts to conceal the contamination from Plaintiff, and its attempt to abandon the contaminated area prior to clean-up demonstrate extreme and outrageous conduct by URI. Such conduct was undertaken intentionally or recklessly by URI, and caused Plaintiff to suffer severe emotional distress as a result.

XIX.
DAMAGES

As a direct and proximate cause of URI's wrongful acts and omissions, Plaintiff has been severely injured and damaged. Such injuries and damages include the following:

1. Personal discomfort, annoyance, and inconvenience for damage to Plaintiff's ranch property;

2. Loss of the productivity of Plaintiff's ranch property;

3. Loss of the use of Plaintiff's property;

4. Loss of the value of Plaintiff's property;

5. Lost rental value of the property;

6. Loss in the value of Plaintiff's livestock;

7. Cost of restoring the Ranch to the condition it was in prior to Defendant's activities, including restoring the soil, aquifer, and vegetation to its prior condition;

8. Damage to the property, to the underground aquifers, and injury to vegetation by past and future restoration activities;

The Plaintiff's injuries and damages are in an amount greatly in excess of the minimum jurisdictional requirements of this Court.

Plaintiff also requests that the Court require URI to specifically perform its obligations with Plaintiff, and with the State of Texas, to restore the land, including, without limitation, the soil, aquifer, and vegetation Defendants contaminated to the condition it was in prior to URI's mining activities.

XX.
PUNITIVE DAMAGES

Defendants' conduct that resulted in the pollution and contamination of Plaintiff's property was fraudulent, malicious, and grossly negligent. It further demonstrated conscious indifference to the rights and welfare of the Plaintiff. Plaintiff is entitled to punitive damages because Defendants intentionally made false statements to Plaintiff concerning the environmental effect of URI's mining and restoration activities. Defendants knew of the falsity of its statements and made them intentionally to deceive Plaintiff or with heedless and reckless disregard of the consequences of their statements.

Plaintiff is further entitled to punitive damages because Defendants' conduct demonstrates malice. Defendants polluted and contaminated the Longoria Ranch, concealed the degree of contamination from Plaintiff, and attempted to deceitfully claim that there was no contamination. Defendants carried out these acts with flagrant disregard for the rights of Plaintiff and with actual awareness that their acts would in reasonable probability result in damage to Plaintiff's property.

Plaintiff is also entitled to punitive damages because of Defendants' gross negligence. Defendants' conduct that resulted in the pollution and contamination of Plaintiff's property demonstrated such an entire want of care that it reflects a conscious indifference to the rights, and welfare of Plaintiff. Defendant's activities on the ranch involved an extreme degree of risk of harm to the Plaintiff. Defendants knew of the risk involved, but nevertheless proceeded with its wrongful activities with conscious indifference to the rights, safety, and welfare of Plaintiff.

XXI.
DISCOVERY RULE

The Discovery Rule applies to this matter. No limitation begins to run until Plaintiff learned of, or in the exercise of reasonable diligence, should have learned of Defendants' misconduct herein complained of. Plaintiff brought suit promptly after learning of the existence of facts constituting the causes of action herein pleaded. Any suggestions that in the exercise of reasonable diligence that Plaintiff should have discovered Defendants' misconduct earlier in incorrect. Accordingly, the defenses of limitations, latches, estoppel or ratification do not apply.

XXII.
ATTORNEY'S FEES

Because of Defendant's wrongful acts and omissions, Plaintiff has had to hire the below signed attorneys to prosecute this suit on his behalf. Plaintiff thereby will incur liability for the usual, customary and reasonable fees for the attorneys' services in the prosecution of the claim. If Plaintiff is successful in the prosecution of his Breach of Contract and Punitive Damages claims, he is entitled to recover the reasonable and necessary attorneys' fees he has incurred.

XXII.
PRAYER

WHEREFORE, PREMISES CONSIDERED, Plaintiff prays that Defendants be cited to answer and appear herein and that, upon final trial hereof, Plaintiff recover judgment against Defendants for damages, exemplary damages, costs, pre-judgment interest, post-judgment interest, attorneys fees, and all such other and further relief at law and equity to which they may show themselves justly entitled.

Respectfully Submitted,

Ricardo de Anda
Laura L. Gomez
DE ANDA LAW FIRM
Plaza de San Agustin
212 Flores Avenue
Laredo, Texas 78040
Tel. (210) 726-0038
Fax. (210) 726-0030

Robert J. Binstock
REICH & BINSTOCK
4265 San Felipe
Suite 1000
Houston, Texas 77027
Tel. (713) 622-7271
Fax. (713) 623-8724

By: Ricardo de Anda
Ricardo de Anda
State Bar No. 056895000

Attorneys for Plaintiff

PLAINTIFF REQUESTS TRIAL BY JURY.

TDH
TEXAS DEPARTMENT OF HEALTH

Jill

Texas Department of Health

William R. Archer III, M.D.
Commissioner

1100 West 49th Street
Austin, Texas 78756-3189
(512) 458-7111

Radiation Control
(512) 834-6688
Fax No. (512)834-6654

Patti J. Patterson, M.D., M.P.H.
Executive Deputy Commissioner

November 20, 1998

CERTIFIED MAIL NO. 950-091
RETURN RECEIPT REQUESTED

URI, Incorporated
ATTN: Mark Pelizza
12750 Merit Drive Suite 1210, LB 12
Austin, Texas 75251

Ref: Escalated Enforcement No. EL98-096
Compliance No. L981128
License No. L03653

Dear Mr. Pelizza:

The facility inspection conducted on September 30, and October 2, 1998, was an examination of the activities conducted under your Radioactive Material License relative to radiation safety, compliance with this Texas Department of Health-Bureau of Radiation Control's (TDH-BRC) rules and regulations, and the Conditions of your License. This inspection consisted of selective examinations of procedures and representative records, interviews, radiation surveys, and observations by TDH-BRC inspectors. The inspection report was submitted to the Austin central office and reviewed by the technical staff. The staff concurs with the findings as presented in the NOTICE OF VIOLATION issued included as an attachment to this letter. The violations of Title 25 of the Texas Administrative Code that were found were reviewed with Michael Maxson, Jim Tarleton, and Rick Van Horn, at the conclusion of the inspection.

The number of violations; three severity level III, six severity level IV, and one severity V violations, noted during this inspection have resulted in a significant, unacceptable deficiency with regard to the application and overall effectiveness of your radiation safety program.

As such, you are hereby afforded the opportunity to appear at a Management Conference before this Agency to discuss Agency concerns pertaining to Radioactive Material License No. L03653. **The Management Conference will be held on January 5, 1999, at 1:30 p.m. at the Bureau of Radiation Control offices, 8407 Wall Street, Austin, Texas 78754.**

You are hereby required to take immediate corrective action and to submit a written report to the Agency no later than 10 days prior to the Enforcement Conference. The reply shall address each violation separately and include statements and explanations of:

1. steps taken to correct the violations and the results achieved,
2. steps which will be taken to avoid repeating the violations, and
3. the date when full compliance will be achieved.

At this Conference you must be prepared to orally review your written responses to the alleged violation in the NOTICE OF VIOLATION, and also provide additional information concerning improvements in your radiation safety program management and implementation of your radiation safety program which are intended to ensure that future violations will be prevented or minimized.

The violation referenced in the NOTICE OF VIOLATION, and the opportunity you are given to respond in writing and in person to show compliance with all conditions necessary to retain your License, fulfills the requirements of Section 2001.054, Texas Government Code, that the Agency give notice to the Licensee of facts or conduct alleged to warrant the intended action prior to the Agency instituting procedures to modify, suspend, or revoke Texas Radioactive Material License L03653.

You may send your response via facsimile to (512) 834-6654, express mail to 8407 Wall Street, Room N127, Austin, Texas 78754, or U.S. Postal Service mail to 1100 West 49th Street, Austin, Texas 78756-3189. (NOTE: U.S. mail sent to 8407 Wall Street will not be delivered.) Correspondence should be directed to the attention of Ms. Cathy McGuire, Coordinator for the Escalated Enforcement Project.

Nothing herein is to be construed as either a limitation upon or a waiver of the use of administrative or judicial remedies available by law to this Agency.

If you have any questions, please contact Ms. Cathy McGuire at (512) 834-6688, extension 2008.

Yours truly,

Rick Muñoz, Project Team Leader
Escalated Enforcement Project
Division of Compliance and Inspection
Bureau of Radiation Control

Attachment

TEXAS DEPARTMENT OF HEALTH
Bureau of Radiation Control
Division of Compliance and Inspection
1100 West 49th Street
Austin, Texas 78756-3189

COMPLIANCE NO: L981128

*** NOTICE OF VIOLATION ***

LICENSEE/REGISTRANT

URI, Incorporated
Attn: Mark Pelizza
12750 Merit Drive Suite 1210, LB 12
Dallas, Texas 75251

DATE OF NOTICE

November 20, 1998

DATE OF INSPECTION

September 30, 1998 &
October 2, 1998

INSPECTOR(S)

Martin Utley
Robin Cooksey

LICENSEE/REGISTRANT REPRESENTATIVE

Michael Maxson, R.S.O.
Jim Tarleton, Plant Manager
Rick Van Horn, VP of Operations

INSPECTION LOCATION

Kingsville Dome Project located in Kleberg County on FM 1118 about 8 miles Southeast of Kingsville, Texas, and about 4 miles East of US Highway 77

REVIEWED BY

Robert L. Green

Please refer to the above COMPLIANCE NUMBER when responding to this notice.

The following alleged violations were found during the inspection of operations under License No. L03653:

1. Violation of 25 TAC §289.202(e)(2) and License Condition 22: [TRCR 21.1101(c)]

   The Licensee failed to use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as reasonably achievable (ALARA). Yellowcake was readily visible within the dryer facility to the extent that inhalation or ingestion by an individual would have been possible.

   This is a Severity III Violation.

2. Violation of 25 TAC §289.257(e)(1) and License Condition 22:

   Transportation of radioactive material outside the site and on public highways, did not comply with the applicable requirements of US DOT regulations in 49 CFR Parts 170-189 which are appropriate to the mode of transport. Transport vehicles did not carry appropriate paperwork associated with the shipment.

   This is a Severity III Violation.

VIOLATIONS CONTINUED ON NEXT PAGE

3. Violation of License Condition 31.B:

The Licensee failed to notify the TDH-BRC when an excursion, as defined by the Commission, had been verified in a monitor well.

This is a Severity IV Violation.

4. Violation of License Condition 38.A:

The Licensee failed to store all solid by-product material, amenable to packaging, in strong, watertight, containers, on curbed concrete pads or other impermeable surfaces of sufficient strength to resist tearing and designed to limit horizontal and/or vertical migration of contaminants from the storage location. Each container was not individually numbered and labeled with the date of closure; and, monthly inspection records of storage containers were not maintained for the month of April, 1998.

This is a Severity IV Violation.

5. Violation of License Condition 38.B:

Equipment, piping, and similar items contaminated with byproduct material which are not amenable to being packaged into a container were not stored on curbed concrete pads or other impermeable surfaces of sufficient strength to resist tearing and designed to limit horizontal and/or vertical migration of contaminants, nor were they sealed in a manner which prevents the horizontal and/or vertical migration of contaminants.

This is a Severity IV Violation.

6. Violation of License Condition 38.C:

The Licensee failed to place all metal containers on pallets or runners, as required to prevent direct contact with the surface of the storage area.

This is a Severity IV Violation.

7. Violations of License Condition 40:

The Licensee failed to possess and use the radioactive material authorized in accordance with statements, representations, and procedures contained in the Application dated October 11, 1983, including the Environmental Assessment, dated October, 1983, the Safety Evaluation Report dated October, 1983, and, the Application and Technical Report, dated November 25, 1985:

a) the Licensee failed to maintain and provide training for a structured response team, as stated in the Environmental Report and the Safety Evaluation Report, dated October 1983, and as stated in the incident response letter (ref: TBRC EA-14, Part II, §4.5.4); and

b) the Licensee failed to maintain the organizational structure necessary to assert proper health physics techniques and procedures as stated in the Environmental Report and the Safety Evaluation Report dated October, 1983 (ref: TBRC EA-14, Part II, §4.0).

These are Severity IV Violations.

VIOLATIONS CONTINUED ON NEXT PAGE

8. Violation of 25 TAC §289.202(ll)(4) and License Condition 22: [TRCR 21.1101(c)]

Records of radiation surveys did not indicate: the date and identification of individual(s) making the record; a unique identification of survey instrument(s) used; and an exact description of the location of the survey, as required.

This is a Severity IV Violation.

9. Violation of 25 TAC §289.202(ll)(4), License Condition 22, and License Condition 38.F: [TRCR 21.1101(c)]

Records of radiation surveys for material to be disposed of or released for unrestricted use did not indicate: the date of the survey; the type of material surveyed; the individual who performed the survey; the instrument(s) used; and or the results of the survey.

This is a Severity IV Violation.

10. Violation of 25 TAC §289.203(b)(1) and License Condition 22: [TRCR 22.11(a)]

Current copies of the License, documents incorporated into the License by reference, and amendments thereto, were neither posted nor available for employee viewing. (The Licensee failed to maintain current copies of the regulations applicable to the licensed facility.)

This is a Severity V Violation.

<u>DO NOT RETURN THIS ORIGINAL "NOTICE OF VIOLATION" WITH YOUR RESPONSE.</u>

TRCR 22.11(a)(4) REQUIRES THAT ANY SUCH NOTICE BE POSTED, OR IN THE ALTERNATIVE, MADE AVAILABLE FOR EMPLOYEE REVIEW, AS PERMITTED BY TRCR 22.11(b).

Phone: (512) 834-6688 Ext. 2009
Fax: (512) 834-6654

REVIEWED BY
RLG:sd

January 7, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of HYDRO RESOURCES, INC. (2929 Coors Road, Suite 101 Albuquerque, NM 87120)	Docket No. 40-8968-ML ASLBP No. 95-706-01-ML

WRITTEN TESTIMONY OF DAVID OSTERBERG

On behalf of Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC"), David Osterberg submits the following testimony concerning the financial qualifications of Hydro Resources, Inc. ("HRI") to conduct the proposed Crownpoint Uranium Solution Mining Project.

Q.1. Please state your name and qualifications.

A.1. My name is David Osterberg. I hold a Bachelor of Arts degree in economics from Washington State University. I also attended the University of Wisconsin-Madison where I earned a Masters Degree in economics, another in water resources management, and a third in agricultural economics. I was an instructor of economics at the University of Wisconsin-Green Bay and assistant professor of economics and business at Cornell College in Iowa. I am presently adjunct associate professor in the Geography Department at the University of Iowa as well as a consultant.

Until January 1995, I was an Iowa State Representative. During my 12 years in the Iowa General Assembly I served terms as chairman of the House Committee on Agriculture, as well as chairman of the House Energy and Environmental Protection Committee. While in the General Assembly, I was a member of the Iowa Energy Policy Council and a member of the Agricultural Energy Management Advisory Council.

A summary of my professional qualifications and experience is provided in my attached resume. (Exhibit A)

Q.2. Have you ever testified before this or other regulatory commissions?

A.2. Yes. I testified before the U.S. Nuclear Regulatory Commission in the matter of siting a nuclear enrichment facility proposed by Louisiana Energy Systems where I was found qualified to testify as an expert on energy economics. On the state level I testified at the request of the Florida Public Service Commission staff in that state's Hearings on the federal Public Utility Regulatory Policy Act definition of "cost of service." I also testified for the staff of the Iowa State Commerce Commission on the same subject. I have testified before regulatory commissions in Iowa, Illinois, Indiana, South Dakota, South Carolina, Kentucky and New York for various clients. I have worked for the Nebraska Energy Office and the Omaha Public Power District. I was also part of an energy study for the state of Missouri.

Purpose, Material Used and Conclusion

Q.3. What is the purpose of your testimony?

A.3. I was retained by ENDAUM and SRIC to evaluate the financial capability of HRI to conduct the proposed Crownpoint Uranium Solution Mining Project. I have worked with my partner Michael Sheehan on this issue. The purpose of my testimony is to discuss my professional opinion concerning whether the proposed mining project would have a positive impact on HRI's financial capability; that is, whether HRI stands to gain financially by conducting the proposed mining.

This testimony will set forth and explain my conclusion that the proposed mining project is not economically viable because there is little likelihood the company could sell uranium at prices that would exceed its actual total cost of producing uranium at the Church Rock Section 8 mine or at the entire Crownpoint Uranium Solution Mining Project.

National and world markets for uranium are decreasing and the supply of uranium and other power plant fuel is increasing. It is therefore my conclusion that the proposed mining would not contribute positively to HRI's financial capability.

Q.4. What materials did you review in preparation for your testimony?

A.4. I reviewed the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico (February 1997) ("FEIS"); data from the Energy Information Administration of the U.S. Department of Energy; industry publications; economic papers and texts. I have also reviewed Michael Sheehan's testimony being provided with ENDAUM and SRIC's Brief on Financial Qualifications, and I have discussed the issues addressed in my testimony with Dr. Sheehan and with other experts.

Q.5. Will mining uranium in New Mexico be financially beneficial to HRI?

A.5. No. The present price of uranium and the likely prices far into the future will be too low and the cost of production on the New Mexico properties will be too high to make the project economically feasible. Michael Sheehan has presented material on the cost of producing uranium ore at Church Rock and the entire Crownpoint project. I will explain why supply of and demand for nuclear power plant fuel makes the price so low.

Demand for Power Plant Fuel

Q.6. Is the uranium market an example of a highly competitive, free market?

A.6. The market is competitive but because of an unusual amount of government intervention it cannot be called totally free. Demand for uranium comes from the electric utility industry around the world. Supply of uranium come from mining companies, brokers, and the excess stocks from the electric utilities that hold uranium in inventories. Governments, including the U.S. government, have also begun to sell inventories. The recently privatized, United States Enrichment Corporation ("USEC"), may sell a great deal of uranium in the next few years.

There has always been a separation between the western world and the former eastern block. Some of the government intervention that I mentioned above is to prevent supplies from the former Soviet Union from entering the U.S. market. There are also restrictions on when USEC and the U.S. Department of Energy ("DOE") can dispose of their inventories. There has also been U.S. government intervention to keep Russian nuclear materials from getting into the hands of those who might use them for military purposes. However, even though the market is not a totally free market, it is free enough that the vast amount of uranium and the decreasing need for it is having a predictable effect on market prices.

Q.7. Explain the demand for uranium?

A.7. Demand for the uranium which will be produced by the proposed Church Rock Section 8 mine and the entire Crownpoint Uranium Solution Mining Project comes from the various commercial nuclear electric generating units located in the United States of America and around the world. Uranium Resources, Inc., in the most recent 10-K for itself and its subsidies (including URI and HRI) admits that power plant fuel is the only significant commercial use for uranium.[1] In the same 10-K, Uranium Resources, Inc. projects a one percent increase in nuclear generating capacity through the year 2000 with good prospects for growth beyond that year.[2]

Q.8. Do you agree with this projection?

A.8. No. The most recent projections from the Energy Information Administration ("EIA") of the DOE contemplate fewer nuclear units than this.

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[1] Uranium Resources Inc. (1997) Annual Report to the U.S. Securities and Exchange Commission, Form 10-K, for the year ended December 31, 1997, Washington, D.C. page 8. Exhibit B.
[2] Ibid.

Q.9. How do the latest EIA projections compare with those reported by Uranium Resources, Inc.?

A.9. The EIA 1998 Reference Case projection for nuclear capacity world-wide is for no growth between 1996 and 2000 followed by about 1 percent growth over the entire ten year period to 2010, (i.e. 0.1 percent per year). After 2010 demand is projected to decrease for at least the next 10 years.[3]

EIA has continuously decreased its projections for worldwide nuclear capacity over the last several years. (See Exhibit E). The EIA 1998 Reference Case includes 9 fewer, large, 1000 MW nuclear units in the year 2000 and 22 fewer large units in the year 2005 than the agency's 1997 Reference Case does. The number of nuclear units projected for the years 2000 and 2005 in the 1998 Reference Case is below all other recent projections, whether they were meant to be high or low, with the exception of the 1997 Low Case projection.

Q.10. Why has the EIA reduced its projections for commercial nuclear units?

A.10 Nuclear units in the U.S. are retiring early. A second EIA report,[4] written in September 1998, documents this. Only 105 of the 110 U.S. units that were on

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[3] Energy Information Administration, (1998) Nuclear Power Generation and Fuel Cycle Requirements 1998, (Not printed, found at www.eia.doe.gov/cneaf/nuclear/n_pwr_fc/data98/prefix3.html), May 1998, Table 1. Exhibit C.

[4] Energy Information Administration, (1998), Challenges of Electric Power Industry Restructuring for Fuel Suppliers, (DOE/EIA-0623), Washington, D.C., September 18, 1998. Exhibit D.

line when the last currently planned nuclear unit went into service in mid-1996 were still in operation in mid-1998. The following five units were taken out of service before they reached their planned life:

Haddam Neck
Big Rock Point
Maine Yankee
Zion 1&2

The same study reported that two additional plants, Millstone 1 and Oyster Creek, expected to close early. Millstone 1 went out of service in July 1998, reducing the number of U.S. units to 104.[5] With the expected closing of Oyster Creek in 2000, after it burns its last load of fuel, the number of U.S. commercial nuclear units will be no more than 103.

Q.11. How does the second EIA report you refer to explain the loss of six commercial units in the U.S. in only two years?

A.11. The report investigates the effect of an emerging new competitive environment for electric utilities that were formerly protected from market forces. It explains early plant closings this way:

> In each case, the utility owner calculated that continued operation was uneconomical given the cost of operating the plant, the market value of the electricity, and the long-term prospects for making the plant economical. [6]

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[5] Energy Information Administration, (1998) Monthly Energy Review, October 1998, Table 8.2. Exhibit F.

[6] Energy Information Administration (1998) Challenge of Electric Power Industry Restructuring for Fuel Suppliers, (DOE/EIA-0623),Washington, D.C., September 18, 1998, p 25. Exhibit D.

Q.12. Do all U.S. commercial units operate well?

A.12. No. Browns Ferry 1 has not produced electricity since 1985. This is an unusually long period of time with no production to continue to be counted as an operating unit. Recently, a petition has been filed by The Union of Concerned Scientists, requested that the NRC revoke the operating license of the unit.[7] Several other plants have not produced electricity for a significant period:

PLANT	DOWN SINCE
Millstone 2	2/96
Clinton 1	9/96
Lasalle 2	9/96
Cook 1&2	9/97[8]

The Union of Concerned Scientists has also petitioned to revoke, modify or suspend the operating license for the D.C. Cook nuclear units. [9] On the other hand, the owners of the Cook units met with the NRC in November to plan for restarting the plants in the first half of 1999.[10]

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[7] Nuclear Regulatory Commission, (1998) NRC STAFF TO HOLD INFORMAL PUBLIC HEARING ON OCTOBER 26 ON PETITION TO REVOKE OPERATING LICENSE FOR BROWNS FERRY UNIT 1, Atlanta, GA, Office of Public Affairs, October 13, 1998. Exhibit G.

[8] Nuclear Regulatory Commission, (1998) Plant Status Report, Washington DC, NRC Operations Center, December 17, 1998. Exhibit H.

[9] Nuclear Regulatory Commission, (1998) NRC STAFF TO HOLD INFORMAL PUBLIC HEARING ON PETITION TO REVOKE, MODIFY OR SUSPEND OPERATING LICENSE FOR D.C. COOK PLANT, Washington, D.C., Office of Public Affairs, July 23, 1998. Exhibit I.

[10] Ux Weekly, (1998) AEP has fourth restart meeting w/NRC, October 5, 1998, p. 4. Exhibit J.

Q.13. Have the recent premature closings and poor performance of some nuclear units had an effect on total production?

A.13. Yes. The most recent statistical review of world energy, British Petroleum reports that consumption of nuclear energy declined for the first time in a decade:

> After a decade of strong growth, consumption of nuclear energy fell by 0.6%. Almost all of this decline resulted from the sharp fall in consumption of 7.2% in the USA and Canada.[11]

Q.14. Does lower consumption of nuclear energy result from a reduction in the capability of operable nuclear units?

A.14. Production and consumption of nuclear energy arises from a combination of the number of operable units and the capacity factor or usage rate for each unit. Production could still increase even with fewer plants if capacity factor continued to increase but the fact that there is the decrease in units puts severe limits on production.

[11] British Petroleum (1998), "1997 in Review", BP Statistical Review of World Energy 1998, available on the world wide web at http://www.bp.com/bpstats/intros/review.htm. Exhibit K.

Q.15 Is the decrease in U.S. nuclear units putting pressure on prices for nuclear fuel?

A.15 The present low prices for uranium stem from many factors on the demand side as well as on the supply side and one cannot point to one factor as being responsible for prices. However, one can say that the existence of fewer nuclear units would tend to depress prices, everything else equal.

Q.16. What about the long run? Will a new competitive environment for U.S. utilities result in more nuclear units vulnerable to early retirement?

A.16. The INGAA Foundation ("INGAA"), an arm of the Interstate Natural Gas Association of America, commissioned a report to determine this answer. The foundation was seeking an estimate of the potential increase in natural gas demand by the electric utility industry as nuclear units go off line.[12] The report methodology contained two separate projections for the future of U.S. nuclear units.

Q.17. You speak of a two-part projection. What does the first part conclude?

[12] The INGAA Foundation, Inc., (1997) Nuclear Power Plants and Implications of Early Shutdown for Future Natural Gas Demand, Washington DC, 1997. Exhibit L.

A.17. The first-part analysis divided nuclear sites into three classes: Top Performers, Good Performers, and Poor Performers, based on economic performance. Operation and Maintenance ("O&M") cost from 1990 to 1995 was used to establish performance. The Poor Performer group included 17 nuclear sites containing 22 individual units. In the words of the report:

> The 17 sites in this group are clearly vulnerable to early shutdown. For this group, non-fuel O&M costs per kWh have increased 27 percent while capacity factor has decreased by 13 percent, from 1990 to 1995. Most of these sites have been plagued by extended shutdowns for safety or operational problems. [13]

Q.18. Have any of the Poor Performer sites in the INGAA report closed as yet?

A.18. Yes. Comparing the INGAA report with EIA's Challenges of Electric Power Industry Restructuring for Fuel Suppliers, which was written one year later, confirms the reality of the potential for early closing identified by the

INGAA. Of the seven plants listed as closed or closing soon in the EIA study, four including Big Rock Point, Haddam Neck, Millstone 1, and Oyster Creek were in the INGAA Poor Performer category.

The Poor Performers did not account for all the recent closings, however. The two Zion units that closed in January 1998 were rated in the Good Performer category. Even more disturbing for sellers of uranium, MaineYankee, which

[13] Ibid, p 36.

closed in August of 1997, was in the Top Performer category.

Q.19. What reasons besides excessive O&M costs made nuclear sites vulnerable to closing before the end of their planned economic life according to INGAA?

A.19. Poor economic performance might cause a nuclear unit to be closed before its license expires. However, some better performing units might also be vulnerable because the projected cost of replacement electric power in some regions of the country will be cheaper than a particular nuclear unit can produce it for, even if the particular unit has not performed poorly relatively to other nuclear units. INGAA put together a second list of nuclear sites that are vulnerable to shutdown. This larger list of 37 sites includes 48 units and represents approximately 40% of all commercial nuclear generation units in the U.S.

The recently closed Maine Yankee plant was placed in the INGAA Top Performer category in terms of trends of O&M costs and was not located in an area where it was forced to compete with cheap alternative power. The fact that such a plant has closed early leads to the conclusion that the INGAA study is not wildly off base in its projections.

Q.20. Do other reports identify plants that are candidates for early closure?

A.20. Yes. An appendix to the INGAA report compares the 17 sites listed as Poor

Performers with the list of "Nuclear Lemons" released periodically by the consumer group, Public Citizen. The 19 lemons include 12 of the sites listed as Poor Performers by the INGAA Foundation. Of the 12 sites (17 units) on both lists, Haddam Neck and Millstone 1 have closed. In addition, one of the closed Zion units made the Lemon list but not the Poor Performer list. The ten remaining sites that made both lists must be considered very vulnerable to early closing.

Q.21. Do other reports contemplate early shut down of nuclear units in the U.S.?

A.21. Yes. A more recent report by Public Citizen finds that 42 nuclear reactors are not competitive.[14] The report compared the O&M costs for 1994-1996 for nuclear units with replacement power in each region. Five of the 42 non-competitive units are among the units that have either closed or announced an early closing.

Q.22. Can you name other studies projecting early nuclear unit closings?

A.22. Yes. A report by Biewald and White[15] gives another projection of early nuclear unit retirements. The report's Reference Case projects that 34 units will retire

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[14] Public Citizen. (1998), Questioning the Authority, Jim Riccio, April. Exhibit M.

[15] Biewald, Bruce and David White, (1998) Implications of Premature Nuclear Plant Closures: Funding Shortfalls for Nuclear Plant Decommissioning and Spent Fuel Transportation and Storage, proceedings for the United States Association for Energy Economics and International Association for Energy Economics 19th Annual North American Conference, October 18 to 21, Albuquerque, New Mexico. Exhibit N.

prior to their license expiration date. A more optimistic case for nuclear plant cost and performance still projects 20 nuclear units to close early. Using more pessimistic assumptions, an amazing 90 units could close early. In all three cases units close, on average, 15 years prior to the end of their 40-year licenses.

Q.23. You speak of 40-year licenses. What will be the effect of extending the licenses of U.S. units for another 20 years?

A.23. Utilities are in the process of extending licenses at several nuclear units including Calvert Cliffs, Hatch and Oconee. However, it is not clear if such extensions will make any real difference. The present 40-year reactor life has not been a constraint on nuclear production since no U.S. nuclear unit has ever reached its planned life. All units going into service more than 40 years ago have closed early. Plans for life extensions demonstrate some utilities are bullish on nuclear power. However, unexpected problems befall nuclear units. Whether Calvert Cliffs has a 40-year license or a 60-year license, it could still close next year if conditions warrant.

Q.24. What do you conclude from your analysis of U.S. nuclear plant closings?

A.24. I agree with the following statement from the EIA:

> A decline in demand brought about by nuclear power plant closings could weaken the price of uranium, forcing producers with marginal production

> costs above the market price to suspend operations. Under a scenario of declining price, relatively higher cost U.S. production would be particularly susceptible to competitive pressures exerted by imports. [16]

Such uncertainty of demand makes one question the economic viability of any new uranium mine. The fact that uranium prices have been steadily falling since the recent round of early nuclear unit retirements began in mid 1996 is consistent with the EIA statement above. The fact that URANIUM RESOURCES, INC. is suffering such economic problems is also consistent.

Q.25. What additional pressures might a competitive utility industry put on the suppliers of nuclear fuel?

A.25. The consolidation in nuclear fuel procurement both because of consolidation through mergers and acquisitions as well as plant closures give the smaller number of utility buyers a stronger hand in the marketplace. In addition, alliances of utilities to jointly operate their nuclear units may further decrease the number of buyers of nuclear fuel. Four Midwest utilities including Alliant Utilities, Northern States Power, Wisconsin Electric Power, and Wisconsin Public Service are exploring the advantages of forming a single organization to service or possibly operate seven nuclear power plants in the region.[17]

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[16] Energy Information Administration (1998) Challenge of Electric Power Industry Restructuring for Fuel Suppliers,DOE/EIA-0623, September 18, 1998, page 38. Exhibit D.

[17] George C. Ford, (1998) "Utilities may operate nuclear plants jointly", The Gazette, Cedar Rapids, Iowa, November 26, 1998 p 9D. Exhibit O.

Q.26. What is the situation with commercial nuclear units in countries other than the U.S.? Specifically, what is the status of nuclear power in Western Europe?

A.26. Demand for nuclear fuel has stalled in Western Europe. A French nuclear unit was connected to the grid in 1998. However, this is the last unit that will come on line until at least 2013 anywhere in Western Europe. At the end of 1993, a moratorium or slowdown in construction of nuclear units was in effect in thirteen countries, eleven of them in Europe.[18] More recently, the governments of Germany and Sweden have both announced early retirements of all nuclear power plants in their countries.

For Germany this is an about face from the previous conservative government, which in December 1997 had modified the country's basic Atomic Law to keep open the option to build new units.[19] Talks between the new German government and the owners of Germany's 19 nuclear power plants are scheduled for January 1999. Chancellor Gerhard Schroeder of the Social Democratic Party who will chair the talks is reported to be in favor of a twenty-year timetable to close all plants, according to Der Spiegel.[20] However, his Environment Minister Juergen Trittin, of the Green Party is said to be pushing for a much shorter, five to 10 year

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[18] Energy Information Administration, (1994) World Nuclear Outlook, DOE/EIA-0436(94), December 1994, p.ix. Exhibit P.
[19] Energy Information Administration, (1998) "Germany" May 1998. Exhibit Q.
[20] Associated Press, (1998) "Germany May Shut Nuke Plants", The Associated Press, Thursday, December 17, 1998. Exhibit R.

timetable.

The Swedish government in February of 1998 gave final approval to the early closure of the Barseback two-unit nuclear station. The Barseback units are two of the 12 units at four sites that supply about half of Sweden's electric power. In elections held in the summer of 1998, the ruling party maintained control of the government, so it is likely that the days of Barseback are limited. However, the scheduled July 1998 closure date for Barseback unit 1 passed without incident because Sweden's Supreme Administrative court has ruled that the plant may continue to operate until all pending legal issues are settled.[21]

France, the one Western European country that is committed to building new nuclear units, brought on a reactor in 1998. However, the next nuclear unit planned in France is not scheduled to come on line until after 2013.

Q.27. Where else in the world are commercial nuclear units being planned?

A.27. At the end of 1996 45 nuclear units were listed as under construction in the world.[22] Twenty-six of these units are in only five countries, Russia, South Korea, India, France and Ukraine. Thirty units are planned or less than 25% complete.[23]

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[21] Swedish Energy Forum, (1998) "National Policy", Swedish Energy Forum, http://www.foratom.org/Sweden/sweden.html, updated 25 Oct. 1998. Exhibit S.
[22] Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, Washington, DC, DOE/EIA-0436(97), Table E3. Exhibit T.
[23] Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, Washington, DC, DOE/EIA-0436(97), Table E4. Exhibit T.

Twenty-five of these planned units are in just four countries, China, Japan, South Korea and India. Thus two thirds of all units being planned or under construction are in only seven countries.

Nuclear expansion depends on market and political conditions in very few countries. Thus, nuclear expansion will be severely hurt by the economic downturn in Asia that will cause a lengthening of completion schedules or outright cancellations in South Korea and Japan.[24] In addition, public opposition to the construction of new nuclear units in Japan could reduce demand as well.[25] Russia and Ukraine will also see significant delays if not cancellation of units because of macro economic problems.

Q.28. What do you conclude?

A.28. EIA data shows a steady drop in projection for future nuclear units around the world. The micro-economic performance of existing individual units, the macro-economics of financing new investment and the politics of nuclear power seems to bode ill for an increase in the demand for nuclear produced electricity.

As far as demand for uranium fuel, I conclude that demand is not robust nor will it be soon. Victor Mourogov, Deputy Director General for nuclear energy of the

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[24] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories DOE/EIA-0619, May 1998, p 50. Exhibit U.
[25] Ibid.

International Atomic Energy Association, recently explained why demand conditions in the western world seem to be pushing down prices for uranium fuel:

> [T]he drastic reduction in the anticipated nuclear power capacity—from 1,000 gigawatts electric (Gwe) once projected to 352 Gwe operating today, plus another 27 Gwe under construction—has resulted in a uranium surplus and in an excess capacity in the front-end fuel cycle services.[26]

More early exits of many of the world's nuclear units will only make the problem for the producers of uranium worse.

Supply of Power Plant Fuel

Q.29. What other sources of power plant fuel compete with the potential output of the Church Rock Section 8 mine and the entire Crownpoint Uranium Solution Mining Project?

A.29. Many sources of nuclear power plant fuel compete with the uranium the proposed mining project would produce. First, there is the output of existing mines and the potential output of mines yet to be opened both in the United States and elsewhere in the western world. Mines in the eastern block are a special case of fuel supply both for direct sales of uranium and for the product that has been enriched in Europe. Production of new uranium from mines made up approximately 58% of 1997 nuclear power plant requirements.[27]

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[26] NuclearFuel, (1998) "IAEA OFFICIAL SAYS GLOBAL INVENTORY OF SPENT FUEL WILL TOP 340,000 MTHM IN 2010" McGraw-Hill, 16 Nov p 7. Exhibit V.

[27] Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London, September 1997, page 217. Exhibit W.

The rest of the supply of power plant fuel came from several sources. One source of this secondary market is uranium and plutonium released from military stocks, some of which must be blended down to make power plant fuel. Another source is inventories of uranium and enriched fuel held by owners of commercial nuclear power plants, as well as material held by brokers and enrichers. Notable here is the large stock held by the USEC. Finally, technological change has decreased the need for uranium and therefore is the equivalent of an increase in uranium supply. Russian centrifuge enrichment plants now require less natural uranium per unit of output and USEC has announced it will begin to underfeed its gaseous diffusion plants.

Q.30. Please take these various sources one at a time. What are the mining competitors to Church Rock Section 8 mine and the entire Crownpoint Uranium Solution Mining Project?

A.30. Uranium Resources, Inc. describes its competitors as 15 major uranium-producing entities, some of which are significantly larger and better capitalized than they are.[28] Eight mines owned by five companies in Canada, Australia, Namibia, and Niger accounted for two thirds of total Western World production of uranium.[29]

[28] Uranium Resources Inc. (1997) Annual Report to the U.S. Securities and Exchange Commission, Form 10-K, for the year ended December 31, 1997, Washington, D.C. page 24. Exhibit B.

[29] Uranium Institute (1998) "Top ten uranium mines 1996-97 (Western world only), Uranium Institute web site http://www.uilondon.org/utopmin.htm. Exhibit X.

A number of countries in the Commonwealth of Independent States (CIS) including Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine and Uzbekistan continue to produce uranium for western reactors.[30]

Q.31. How will military uranium and plutonium affect the supply of power plant fuel?

A.31. Military uranium and plutonium is such an important new source of power plant fuel that the EIA analyzed it in a special report in May 1998. Former military power plant fuel comes from both Russian and U.S. stocks. The Agreement between the Government of the United States and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons ("the Russian HEU Agreement"), signed in 1993, created the largest component of this new supply source. The Russian government has agreed to supply to the U.S. 500 metric tons of highly enriched uranium ("HEU") over 20 years. The material is to be delivered to USEC, which is to pay only for the enrichment services component of the low enriched uranium ("LEU") derived from HEU. The natural uranium feed component of the LEU can be sold separately by Russia.

The announcement by President Clinton in March 1995 that declared 200 metric

[30] Energy Information Administration (1996) Uranium Purchases Report 1995 DOE/EIA-0570(95), Washington, D.C., June 1996, Table 1. Exhibit Y.

tons of U.S. military HEU and plutonium as surplus, is the second major military source that competes with the Church Rock and Crownpoint project.

Q.32. How much Russian HEU has been purchased by the U.S.?

A.32. Russian surplus inventories included in the Russian HEU agreement are equivalent to 398 million pounds of natural uranium concentrate ("U3O8") from mined ore. This amount could fuel all the commercial nuclear units in existence in 1997 for three years.[31] The HEU is being blended down to LEU which can be burned in commercial nuclear units. The down blending is taking place in Russia. First shipments of LEU arrived in the U.S. in 1995 and have continued since. The delivery schedule stretches over twenty years.

Q.33. How much Russian HEU exists?

A.33. Much more HEU remains in the Russian military program. In 1994, it was estimated that 1270 metric tons of HEU (including the 500 metric tons sold to the U.S.) were in the possession of the Russian government. Further reductions in nuclear weapons could release some of this HEU for use in commercial power plants.

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[31] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 2. Exhibit U.

Q.34. Are the Separative Work Units ("SWU") in the Russian LEU a substitute for the uranium that would be produced by the Church Rock Section 8 mine?

A.34. It is not the SWU or effort expended in enriching uranium but the Russian feed that competes directly with natural uranium. Russian feed includes the equivalent U3O8 and conversion contained in both the slightly enriched blend stock and the HEU feedstock that is used to produce the LEU. There are legal limits on selling Russian feed in the U.S., but fewer limits on its sale elsewhere. Therefore, the 18.8 million pounds U3O8 that are scheduled to be made available from the sale of 4.4 million SWU in 1998 and the 24.4 million pounds of U3O8 in the years 1999 through 2001 will put competitive pressure on world markets for uranium.

In the future Russian feed will be sold with fewer constraints in the U.S. By 2010 Russian feed permitted by U.S. laws to be sold in this country will equal one half of U.S. reactor requirements, even assuming a very generous survival rate for nuclear units.[32]

Q.35. How much U.S. military HEU has been released from military use to be used as power plant fuel or to be disposed of as waste?

[32] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p.52. Exhibit U.

A.35. US surplus HEU released to date is 174 metric tons.[33] Much of the material (at least, 18 metric tons), contained in spent fuel and other forms, is likely to be disposed of as waste. Other material, labeled as "off-specification," cannot meet the specifications of the American society for Testing and Materials for use as commercial nuclear fuel. However, the Tennessee Valley Authority (TVA), a government-owned corporation, and DOE have agreed to downblend this material into LEU specifically for TVA commercial nuclear units. Since TVA is getting the material cheaply, it will make it work in its reactors. This 38 metric tons of HEU will use some DOE blend stock as well so it will displace 17.7 million pounds of U3O8.[34]

USEC is to take 63 metric tons of HEU. This will displace 19.2 million pounds of U3O8 from traditional sources of uranium. Most of the remaining 55 metric tons of HEU will not be released from defense inventories until after 2010.[35] Some of this may be waste but most will be used in commercial nuclear units in the future.

Q.36. How much HEU exists in the U.S. military inventory?

A.36. The U.S. military has declared only 174 metric tons of HEU to be surplus out of

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[33] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 30. Exhibit U.
[34] Ibid.
[35] Ibid.

the 749 metric tons estimated to be in the nation's inventory.

Q.37. What about plutonium declared redundant by the two superpowers?

A.37. Use of plutonium in commercial power plants will require that commercial nuclear units burn mixed oxide fuel ("MOX"). MOX from power plant grade plutonium is now used to power reactors in Belgium, France, Germany, Japan, Switzerland, and the United Kingdom. However, MOX made from weapons grade plutonium would be new.

Q.38. Why do you believe that MOX from weapons will be used in power plants?

A.38. Russian defense plutonium has a good chance of becoming fuel for commercial power plants. The Russian MOX program got an important boost when Congress appropriated $200 million to help get it underway as a method of disposing of Russian bomb material in a way that keeps it out of the hands of those who might be a danger to the U.S.[36] The Russian government could burn up to two tons of MOX annually in some of their VVER-1000 commercial power stations. However, using more MOX than this might require the use of new breeder reactors or sale of the fuel to another country.

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[36] Nuclear Fuel, (1998) "MOX EFFORT NEAR STALL, AGAIN; OPPONENTS QUESTION U.S. LIABILITY", McGraw-Hill, 16 November, 1998, p12. Exhibit V.

MOX from U.S. plutonium is also a possible source of power plant fuel. If it is used it could provide the equivalent at least 17 million pounds of U3O8 over the next 20 years.[37] However, use of this product in the U.S. requires a policy change. DOE has been negotiating directly with TVA to arrange a test burn of MOX fuel in a commercial unit. It is not certain that MOX fuel will be used in the U.S., although there is a chance some of the material may be burned in Canadian heavy water reactors.

Q.39. Please comment on the supply of nuclear fuel in inventories held by utilities, the USEC, and others.

A.39. Uranium inventories held by utilities and uranium suppliers in the U.S. equaled 72.5 million pounds U3O8 at the end of 1995, increased to 81.2 million pounds of U3O8 by the end of 1996,[38] and stood at 75.8 million pounds at the end of 1997.[39] Commercial inventories are likely to continue to be an important part of supply. At least one expert projects that most excess utility inventories will be drawn down by 2005.[40] A portion of imports from the CIS, especially from Kazakhstan,

[37] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 38. Exhibit U.

[38] Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 54. Exhibit U.

[39] Energy Information Administration, (1998) Uranium Industry Annual 1997, Table H-3, April 1998. Exhibit Z.

[40] Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London, September 1997, page 221. Exhibit W.

Russia, and Uzbekistan are assumed to exceed annual production and thus, come from inventories as well.

Q.40. What effects will restructuring U.S. electric utilities have on uranium inventories held by the owners of nuclear units?

A.40. More competitive electricity producing companies might be expected to move to a just-in-time strategy for inventories. While some inventories might be held as a hedge against price change, the overall change to competition should bring about a reduction in inventories for U.S. utility companies, according to a recent EIA report.

> As the electric power industry moves toward competitive retail markets, nuclear generating companies are likely to minimize inventory holding costs for both economic and regulatory considerations.[41]

Q.41. What effect will closing nuclear units early have on the supply of uranium.

A.41. When Haddam Neck closed in 1997, 500,000 pounds of U3O8 was made surplus and put on the market. The loss of one small nuclear unit placed surplus uranium equal to 9 percent of 1997 domestic production on the market.

There can be both demand and supply consequences of early closing of nuclear units. Whereas, closing the two Zion units will reduce annual requirements for

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[41] Energy Information Administration, (1998), Challenge of Electric Power Industry Restructuring for Fuel Suppliers, DOE/EIA-0623, September 18, 1998, p 39. Exhibit D.

uranium by 1.0 million pounds of U3O8, such early closings can also increase the availability of uranium by bringing plant inventory on to the market.

Q.42. What inventories are held by USEC?

A.42. The trade journal NuclearFuel reported in July 1998 that USEC inventories are roughly 75 million pounds U3O8 equivalent.[42] The large size of the stock led a number of uranium producers in the U.S. to file suit to obtain a declaration that some of the transfer of natural uranium from DOE to USEC was illegal. The transfers are or natural uranium and are not part of the HEU discussed above.

Q.43. Has this large USEC inventory affected the market for uranium?

A.43. Yes. The announcement of a USEC inventory that was larger than expected has pushed market prices for U3O8 to very low levels. According to Uranium Resources, Inc.:

> Since the date USEC disclosures were announced the spot price of uranium has declined 16%, from $10.90 to the current price of $9.15 per pound.[43]

The problem with the size of the inventory is that USEC needs only about 13 million pounds for its enrichment operations. USEC will now sell natural

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[42] NuclearFuel, (1998) "USEC INC. STOCK BEGINS TRADING AT $14.25; TIMBERS BACKS HEU DEAL, HEALTHY U MARKET", NuclearFuel, 27 July, 1998, p. 17. Exhibit AA

[43] Uranium Resources Inc. (1998) Quarterly Report to the U.S. Securities and Exchange Commission for the period ended September 30, 1998, Form 10-Q, Washington, D.C. page 10. Exhibit BB.

uranium as well as enrichment services.

Q.44. Aside from DOE's transfer of natural uranium to USEC, what other sources of uranium inventory are held by DOE?

A.44. Aside from its transfers to USEC, DOE holds the an inventory of Russian feed purchased over the last several years by the U.S. government. There are limits on how fast this stock can be disposed of, but there is no question that it will eventually come on to the market.

Q.45. What other inventories are significant?

A.45. Recently, 20 metric tons of enriched uranium ("EUP") from Kazakstan was imported into the U.S. Selling this material will take a modification of the very complicated US-Kazakstan suspension agreement.[44] USEC and an ad hoc group of U.S. uranium mining firms oppose the deal. The 20 metric tons of Kazak uranium was enriched in former Soviet Union. It is believed there are several hundred metric tons of this material in Kazakstan.

Q.46. Explain the fourth component of supply, technological change.

[44] NuclearFuel (1998) "LITTLE PROGRESS MADE ON HEU FEED DEAL; MINERS, USEC CHALLENGE KAZAK AMENDMENT",McGraw-Hill, September 21 1998, p. 17. Exhibit CC.

A.46. USEC is changing the way it enriches uranium according to the company's S-1 report to the U. S. Securities & Exchange Commission. USEC will underfeed its gaseous diffusion units, (i.e. use less uranium and more SWU, to produce each kilogram of enriched uranium).[45] The industry biweekly NuclearFuel calls the plan the equivalent of a new 3.9 million pounds per year uranium mine.

The amount is quite significant. NuclearFuel stated just how much difference recent events could make on price:

> [a]fter USEC filed its S-1 registration, announcing an aggressive uranium sales campaign, the Uranium Exchange Co., in a widely discussed analysis, said that with USEC sales of its inventory and uranium it was producing through underfeeding the gaseous diffusion plants, the price of uranium in the U.S. could drop to a range of \$6-\$8/lb U3O8 by the year 2000."[46]

NuclearFuel itself was not so gloomy about future prices, guessing along with a number of analysts that the spot price in the U.S. would decline to "slightly below \$10/lb over the next few months."[47]

Q.47. What technological changes in the Russian enrichment corporation might have an effect on the uranium market?

A.47. Tecnological change in the Russian enrichment plants makes them fierce

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[45] NuclearFuel, (1998) "USEC STARTLES MINERS, HILL, EVEN DOE BY PLANS TO SELL NATURAL U THROUGH 2005" McGraw-Hill, July 13, 1998 p.1. Exhibit DD.
[46] NuclearFuel (1998) "BUYERS/SELLERS FACE UNCERTAIN MARKET", McGraw-Hill, July 27, 1998, p20. Exhibit AA.
[47] Ibid.

competitors. In another bit of information from USEC's S-1 filing to the U.S. Securities & Exchange Commission, USEC described Techsnabexport (Tenex), Russia's nuclear enrichment company, as a very low cost competitor. Alexander Chernov, president of Global Nuclear Services & Supplies Ltd., the Russian nuclear fuel trading organization, at recent meeting in Tucson talked of significant improvements in Russian enrichment technology. In prepared remarks that will give no joy to uranium producers, Chernov said Tenex has been able to reduce its need for the natural uranium by about 30% by reprocessing enrichment tails that had hither to been unavailable.[48]

<u>Present and Future Market Prices for Uranium</u>

Q.48. How will the price of uranium be affected by the various events and policies you have described?

A.48. Only a year ago EIA was projecting the price for uranium in the next decade to be \$14 to \$17 per pound of U3O8. However, this price estimate failed to take into account the demand and supply conditions that I have described above. To summarize, last year's projections did not include the following:

> (a) the decrease in demand for nuclear fuel caused by the early closing of many more nuclear units; (b) the release of 55 additional metric tons of the total 174 tons of HEU declared surplus by the U.S. government; (c) the use of defense plutonium in MOX fuel in Russia and perhaps in the U.S.; (d) the possibility of releases of more defense stocks of HEU and

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[48] NuclearFuel, (1998) "USEC BEATS RUSSIAN AMENDMENT DEADLINE, FILES TWO NEW MATCHED SWU CONTRACTS", McGraw-Hill, October 19, 1998, p 3. Exhibit EE.

> plutonium from U.S. and Russian vast supplies; (e) the strength of the market's reaction to the transfer of natural uranium from the DOE to USEC; (f) the release of DOE holdings of Russian feed purchased over the last several years; (g) the disclosure of former USSR military uranium supplies available from Kazakstan; (h) the underfeeding of the USEC gaseous diffusion enrichment plants; and (i) the newly announced efficiencies in the Russian gaseous centrifuge plants.

I have stated before that the uranium market is characterized by a great deal of government intervention. However, it is free enough that the vast amount of uranium and the decreasing need for it is having a predictable effect on market prices. Industry analysts have predicted prices from $6 to $8 per pound of U3O8 over a significant period of time into the future. Since prices of this magnitude actually existed as recently as 1991/1992, these estimates should be considered quite possible.

Uranium Resources, Inc. expects prices at least as low as the $9 per pound range to continue into the future because of newly disclosed uranium inventory levels held by USEC plus military sales from Russia and the U.S. They state that these sources of supply will:

> continue to depress uranium prices or to inhibit prices from rising to higher levels over the next several years. [49]

Q.49. Is there a likelihood that Uranium Resources, Inc.'s subsidiary HRI will benefit from mining uranium from the Church Rock Section 8 mine and the entire Crownpoint Uranium Solution Mining Project?

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[49] Uranium Resources Inc. (1998) Quarterly Report to the U.S. Securities and Exchange Commission for the period ended September 30, 1998, Form 10-Q, Washington, D.C., Page 10. Exhibit BB.

A.49. I do not believe so. Uranium Resources, Inc. gives average production costs per pound of yellowcake at the several sites that make up the Crownpoint Uranium Solution Mining Project. None of the cost estimates falls below $9.40 per pound. The costs at the Church Rock site are between $11.32 and $11.83 per pound.[50] Realizing that total cost is in excess of production costs, these sites do not look competitive in the present and future markets which are characterized by falling demand and many new or expanded sources of supply or supply or supply equivalents.

The secondary supply made up of military and civilian inventories and efficiencies in converting uranium to power plant fuel will dominate the market for years to come. High cost current and proposed primary production will have difficulty competing. As T.C. Pool of the Uranium Institute states:

> These types of primary production are not necessary, at this time, to bring supply and demand into balance.[51]

This speaks directly to URI's situation in New Mexico. Comparing the cost estimates at the New Mexico mines presented by Dr. Sheehan with the likely price of uranium, one must conclude that the project will not help HRI's financial situation.

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[50] U.S. Nuclear Regulatory Commission, Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico, Hydro Resources, Inc. NUREG-1508, p. 5-2. Exhibit FF.

[51] Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London,September 1997, page 223. Exhibit W.

Q.50. Does this conclude your testimony?

A.50. Yes, it does.

AFFIRMATION

I declare on this 7th day of January, 1999, at Mt. Vernon, Iowa, under penalty of perjury that this testimony is true and correct to the best of my knowledge, and that the opinions that I have expressed are based upon my best professional judgment.

David Osterberg

Subscribed and sworn to before me on this 7th day of January, 1999 at Mt. Vernon, Iowa by David Osterberg.

Lori Winder
Notary Public

My Commission Expires: 1-18-00

Exhibit A

19901

David Osterberg
318 2nd Avenue North
Mount Vernon, Iowa 52314
Voice (319) 895-8731

E-mail david-osterberg@uiowa.edu
E-mail osterbergd@aol.com
Fax (319) 895-0022

LEGISLATIVE & POLITICAL EXPERIENCE (1983-1998)
Democratic Candidate, for United States Senate from Iowa, 1998.

Chair, House Committee on Energy and Environmental Protection (1991-1992); and Chair, House Committee on Agriculture (1987-1990) Iowa General Assembly.

Member Agricultural Energy Management Advisory Council (1987-1989) Council oversaw $1.5 million per year budget for education and demonstration projects on tillage practices, fertilizer management and pesticide use to reduce chemical inputs and reduce the potential for groundwater contamination.

Co-Chairman Interim Legislative Committee on Water Quality (1985 and 1986)
Set the agenda for an interim committee that took testimony, gathered information and devised legislation which became the Iowa Groundwater Act of 1987.

Member of the Energy Policy Council (1985-1986)
Seven member Council oversaw all energy related expenditures for the state of Iowa. Abolished with State Reorganization in July 1986.

US-Japan Environmental Mission (May 1991) sponsored by the Council of State Governments/U.S.- Japan Foundation of New York; and Swedish-American Bicentennial Travel Grant (Summer 1986) sponsored by the Swedish Ministry of Agriculture and the Swedish Institute.

TEACHING (1966-1998)
University of Iowa, Iowa City, Iowa
1985-Present
Currently Adjunct Associate Professor, Department of Geography; teaching graduate and undergraduate courses in Environmental Policy. Additional courses for Urban and Regional Planning, Preventive Medicine and the Labor Center.

Dalarna University, Borlange, Sweden
Spring 1997
Lecturer in Environmental Tourism.

Cornell College, Mt. Vernon, Iowa
1975-1982
Assistant Professor of Economics and Business.

TEACHING (Continued)
University of Wisconsin-Green Bay, Green Bay, Wisconsin
1972-1973
Lecturer in Modernization Processes and Natural Resources Economics.

Peace Corps, Iran Project X
1966-1968
Taught English to Iranian high school students and became fluent in Persian.

CONSULTING (1978-1998)
Osterberg and Sheehan, Public Utility Economics; expert witness before regulatory Commissions in 8 states and the U.S. Nuclear Regulatory Commission.

Osterberg Consulting; writing and speaking on issues of natural resources, energy and taxation policy.

EDUCATION
M.S. Agricultural Economics, University of Wisconsin-Madison, June 1975.

M.S. Water Resources Management, University of Wisconsin-Madison, August 1972.

M.A. Economics, University of Wisconsin-Madison, August 1969.

B.A. Economics with departmental distinction, Washington State University, Pullman, Washington, February 1966. Junior year spent at Stockholm University, Sweden.

HONORS
University honors: Phi Beta Kappa, Phi Kappa Phi, Phi Eta Sigma
Ford Foundation Fellowship, Environmental Protection Agency Traineeship

Honors for legislative service from: Iowa League of Women Voters, Iowa Citizen Action Network, Iowa Division Izaak Walton League, Methodist Federation for Social Action, Iowa Farmers Union, Farm Unity Coalition, Cedar Rapids Audubon Society, Iowa Soil & Water District Commissioners, Sierra Club of Iowa.

COMMUNITY ACTIVITIES
Founding board member, Iowa Environmental Council 1994 to present; board member, Iowa Trails Council, 1992 to present; PrairieFire Rural Action, 1994 to present; and Iowa Citizen Action Education Foundation, 1997 to present.

DAVID OSTERBERG'S TESTIMONY SUBMITTED SUBJECT TO CROSS-EXAMINATION

Partner in Osterberg and Sheehan, Public Utility Economists, expert witness before Regulatory Commissions in 8 states & the Nuclear Regulatory Commission.

Date of Testimony	Subject/Company	Witness for
1999 Not Set	In the Matter Of: Private Fuel Storage, LLC Docket No. 72-22-ISFSI **(Nuclear Regulatory Commission)**	Utah Department of Environmental Quality
1999 January	Proposal to Construct and Operate the Crownpoint Uranium Solution Mining Project - Crownpoint NM Docket No. 40-8968 **(Nuclear Regulatory Commission)**	New Mexico Env. Law Center; Eastern Navajo Dine Against Uranium Mining; Southwest Research & Information Center
1995 March	Proposal to construct Uranium Enrichment Facility in Homer Louisiana, by Louisiana Energy Services, L.P.,Docket 70-3070-ML **Nuclear Regulatory Commission)**	Sierra Club Legal Defense Fund and Citizens Against Nuclear Trash
1990 August	Proposal to modify gas rates in the matter of an adjustment of gas and electric rates of the Union Light, Heat and Power Company, Case No. 90-041 (**Kentucky**)	Attorney General Commonwealth of Kentucky
1989 November	Proposal to modify electric rates of Public Service Company of Indiana, Inc. Cause Nos. 37414-S2 and 38809 (**Indiana**)	City of Terre Haute, Citizens Action Coalition of Indiana, Inc.
1987 December	Proposal to modify avoided cost rates for small power production under Section 210 of PURPA, Docket No. 80-251-E (Settlement reached prior to submission of testimony.) (**South Carolina**)	Aquenergy, Inc. and Riegel Power Corporation Greenville, SC
1987 October	Affidavit submitted in proposal to lower retail electric rates of the Public Service Company of Indiana, Inc. Cause 38411 (**Indiana**)	City of Terre Haute, & Citize Action Coalition of Indiana, Inc.

1987 July	Proposal to modify retail electric rates of New York State Electric & Gas Corporation, Case Nos. 29541, 29542 (**New York**)	Public Utility Law Project Albany, NY
1985 July	Proposal of rate design for Duke Power Co., Docket No. 85-78-E (**South Carolina**)	South Carolina Consumer Advocate Office
1984 December	Proposal to modify Avoided Cost rates for small power production under Section 210 of PURPA, Doc. no. 80-251-E (**South Carolina**)	Aquenergy Inc., Greenville, SC
1984 October	Critique of Union Electric phase-in of Callaway Nuclear Power Plant, Docket No. 84-0109 (**Illinois**)	Illinois Office of Consumer Affairs
1984 October	Proposal to lower customer service charge for Niagara-Mohawk Power Co., Case No.'s 28798, 28799, and 28800 (**New York**)	NY Community Action Network; Public Utility Law Project, Albany NY
1983 August	Critique of company rate design in Ottertail Power Company, Doc. F-3418 (**South Dakota**)	Citizens for Equality Sioux Band, Sissiton, SD
1982 April	Proposal to modify retail electric rates of New York State Electric & Gas Corporation, Case Nos. 29541, 29542 (**New York**)	Public Utility Law Project Albany, NY
1982 April	Opposition to Petition for Franchise of 4.2 miles of 72,000 volt transmission line in Clayton County, Docket No. E-19540 (**Iowa**)	Landowner in Clayton County Iowa
1981 November	Critique of Company rate design n Iowa Electric Light & Power Co.'s Rate Case, Docket No. RPU 81-20 (**Iowa**)	Citizens for Community Improvement, Des Moines, IA
1981 September	Critique of Company rate design n Iowa Public Service Company Rate Case, Docket Nos. RPU 81-8 and TF 81-50 (**Iowa**)	Iowa Citizens-Labor Energy Coalition, Des Moines, IA

1981 March	Endorsement of Marginal Cost Pricing as appropriate in setting rates for Electric Utilities in Florida, Docket No. 790593-EU **(Florida)**	Staff of the Florida Public Service Commission
1981 March	Critique of Company rate design in Iowa Power & Light Company Rate Case, Docket Nos. RPU 78-27, RPU 80-36 **(Iowa)**	Legal Services Corporation of Iowa, Des Moines IA
1981 January	Proposal of Rules regarding Avoided Cost rates for cogeneration and small power production under Section 210 of PURPA, Docket No. RPU 80-1 **(Iowa)**	Continental Hydro Corporation, Chicago, IL
1980 November	Critique of the Iowa Electric Light & Power Co.'s estimation Facility (650 MW coal-fired power plant), Docket No. GCU 79-1 **(Iowa)**	Solar Advocates to Conserve Kilowatts, Ames, IA
1980 July	Proposal of Rules regarding Marginal Cost Pricing methodology for determining Utility Rates, Docket No. RMU 80-1 **(Iowa)**	Staff of the Iowa Iowa Commerce Commission
1978 September	Critique of Iowa/Illinois Gas and Electric's Benefit/Cost Analysis of the Louisa County Generating System (650 M/W coal-fired power plant), Docket No. GCU 77-1 **(Iowa)**	Community Action Research Group, Ames, IA

Exhibit B

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
FORM 10-K

(Mark One)
[X] ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
[Fee required]

For the fiscal year ended December 31, 1997 or

[ ] TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES ACT OF 1934
[No fee required]

For the transition period from __________ to __________

Commission file number 0-17171

URANIUM RESOURCES, INC.
(Exact name of Registrant as specified in its Charter)

DELAWARE	75-2212772
(State of Incorporation)	(I.R.S. Employer Identification No.)

12750 MERIT DRIVE, SUITE 1020, DALLAS, TEXAS 75251
(Address of principal executive offices, including zip code)
(972) 387-7777
(Registrant's telephone number, including area code)

SECURITIES REGISTERED PURSUANT TO SECTION 12(b) OF THE ACT: NONE

SECURITIES REGISTERED PURSUANT TO SECTION 12(g) OF THE ACT:

Common Stock, $.001 par value per share

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes [X] No [ ].

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (Section 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. [ ]

The aggregate market value of the Common Stock of the Registrant held by nonaffiliates at March 24, 1998 was approximately $19,743,168.

Number of shares of Common Stock outstanding as of March 24, 1998: 12,053,027 shares.

Documents Incorporated by Reference:

Document	Location in 10-K
Proxy Statement for 1998 Annual Meeting of Stockholders	Part III

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URANIUM RESOURCES, INC.
ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 1997

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URANIUM RESOURCES, INC.

ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 1997
PART I

The "Company" or "Registrant" is used in this report to refer to Uranium Resources, Inc. and its consolidated subsidiaries. Items 1 and 2 contain "forward-looking statements" and are made pursuant to the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements include, without limitation, statements relating to management's expectations regarding the Company's reserve base, timing of receipt of mining permits, production capacity of mining operations planned for properties in South Texas and New Mexico and planned dates for commencement of production at such properties, business strategies and other plans and objectives of the Company's management for future operations and activities and other such matters. The words "believes," "plans," "intends," "strategy," "projects," "targets," or "anticipates" and similar expressions identify forward-looking statements. The Company does not undertake to update, revise or correct any of the forward-looking information. Readers are cautioned that such forward-looking statements should be read in conjunction with the Company's disclosures under the heading: "Cautionary Statement for the Purposes of the 'Safe Harbor' Provisions of the Private Securities Litigation Reform Act of 1995" beginning on page 22.

Certain terms used in this Form 10-K are defined in the "Glossary of Certain Terms" appearing at the end of Part I hereto. As used herein, "Western World" is a uranium industry term referring to the countries from which statistics are available for the purpose of compilation of data relating to the industry, and generally refers to those countries outside the Republics of the Commonwealth of Independent States (the "CIS"), Eastern Europe and the Peoples Republic of China.

ITEM 1. BUSINESS.

THE COMPANY

GENERAL

Uranium Resources, Inc., a Delaware corporation (the "Company"), was formed in 1977 to acquire, explore and develop properties for the mining of uranium in the United States using the in situ leach ("ISL") mining process. The Company is recognized as a leader in the field of ISL mining.

In the ISL process, groundwater fortified with oxidizing agents is pumped into the ore body causing the uranium contained in the ore to dissolve. The resulting solution is pumped to the surface where it is further processed to a dried form of uranium which is shipped to conversion facilities for sale to the Company's customers. The ISL process is generally a more cost effective and environmentally benign mining method than conventional mining techniques.

From March 1988 until September 1990 the Company produced a total of approximately 1.5 million pounds of uranium from its Kingsville Dome property in South Texas, and from October 1990 through March 1992 it produced a total of approximately 1.1 million pounds of uranium from its Rosita property also located in South Texas. The Kingsville Dome property was shut-in in September 1990 and the Rosita property in March 1992 due to the decline in the uranium spot market price to below the Company's production costs.

In anticipation of the firming and increase in the spot price of uranium, in mid 1994 the Company began plans for the resumption of production at its Rosita and Kingsville Dome properties. In June 1995 production was recommenced at the Rosita property and preproduction activities were begun at the Kingsville Dome property with production established in March 1996. Since the re-establishment of production and through December 1997 the Company has produced approximately 1.3 million pounds from Rosita and 1.5 million pounds from Kingsville Dome at average production costs of $11.90 and $13.65 per pound, respectively. During 1997 the Company produced 640,000 pounds from Kingsville Dome at an average cost of $15.47 and production from Rosita was 230,000 pounds at an average cost of $16.92.

Generally, the Company sells uranium to electric utilities under long-term contracts that provide for minimum prices which escalate with inflation. See "-Marketing Strategy/Uranium Sales Contracts." It is the only publicly-owned uranium production company in the United States whose activities exclusively involve the commercial ISL production of uranium.

As of February 28, 1998, the Company had 115 employees, including its professional staff consisting of 10 geologists, 6 engineers, one chemist, two landmen and two certified public accountants. To support its production, exploration and permitting activities, the Company maintains regional offices in Corpus Christi, Texas and in Albuquerque, New Mexico, and field offices at the Kingsville Dome site, the Rosita site and in Crownpoint, New Mexico.

BUSINESS STRATEGY

During 1995, the Company developed and began the implementation of a multi-phase strategy to exploit its existing production base and technical expertise and to identify, acquire, permit and develop additional ISL amenable uranium properties. The Company is implementing its strategy through (i) continued production at its existing production sites; (ii) making capital expenditures for property exploration, acquisition and development; (iii) permitting additional development sites; and (iv) reviewing opportunities to sell uranium outside the United States.

After ceasing uranium production in the early 1990s because of depressed market prices, the Company resumed production at Rosita and Kingsville Dome in June 1995 and March 1996, respectively. During the period the Company was not producing uranium, it was able to purchase uranium to fulfill its existing contracts at a price lower than its cost of production. For the year ended December 31, 1997, the Company produced approximately 871,000 million pounds of uranium at an average cost of $15.85 per pound. The Company estimates that for 1997, its uranium production was approximately 15% of the total U.S. production and approximately 2% of the total Western World production.

In June 1996, the Company acquired for $4 million (of which $1 million is recoverable against one-half of future royalties) a mineral lease on the Alta Mesa properties located in South Texas which are estimated by the Company to contain 6.2 million pounds of in-place proven and probable uranium reserves (estimated 4.0 million pounds recoverable).

In March 1997, the Company acquired for exploration and development potential certain uranium mineral interests covering approximately 500,000 acres in northwestern New Mexico from Santa Fe Pacific Gold Corporation ("Santa Fe"). In this transaction, the Company issued 1.2 million shares of it's Common Stock and undertook a commitment to expend certain amounts on exploration. Approximately one-third of this acreage comprises uranium mineral rights and the remaining acreage comprises exploration rights with rights to purchase and develop any mineral interests found excluding coal. Included in the purchase was the acquisition of a previously existing royalty obligation from the Company to Santa Fe on certain properties that were leased from Santa Fe.

The Company has two development projects in South Texas, Vasquez and Alta Mesa, both targeted to commence production in the latter part of 1998 or early 1999. The Company also has three development projects in two districts in New Mexico, the Churchrock district and the Crownpoint district. Permitting and licensing is in process at all such projects. Commencement of production at these properties is subject to timely permitting, the availability of sales contracts and the availability of capital.

MARKETING STRATEGY/URANIUM SALES CONTRACTS

Long-term contracts are a primary focus of the Company. Spot sales will be utilized to manage inventories and optimize revenues. The Company intends to use matched sales in amounts up to its available quotas through 2003 to maximize profitability. All contracts together will result in a portfolio that is targeted to provide upside market price participation while limiting down-side price risk.

As of December 31, 1997, based on prices escalated in accordance with the contract terms through that date, the Company had long-term contracts for approximately $54,542,000 of future sales for deliveries through 2002, as compared with contracts for approximately $73,359,000 as of December 31, 1996, in each case excluding the revenue related to the sale of Russian uranium under the matched sale program. The Company's long-term sales contract portfolio includes a mix of various pricing terms. The Company has contracts that have a market-related price, with a price ceiling and price floor subject to escalation for between 80%-100% of future inflation. The Company also has contracts with fixed prices which are also subject to escalation for between 80%-100% of future inflation. One other contract is based upon 99% of market price without a floor or a ceiling.

The following table provides information concerning the Company's long-term sales contracts from January 1, 1998 through 2002 (excluding the delivery of Russian uranium) with prices escalated through December 31, 1997 and using the December 31, 1997 spot price of uranium for the market price based contracts:

	1998	1999	2000	2001	2002	Total
Number of customers	6	5	4	3	2	N/A
Total long-term contracted Deliveries (thousands of Pounds)	1,439	872	753	568	250	3,882
Total sales (thousands)	$21,517	$12,090	$10,033	$7,398	$3,504	$ 54,542
Average minimum sales Price per pound	$ 14.95	$ 13.86	$ 13.32	$13.04	$14.01	$ 14.05

For deliveries in periods subsequent to 1998, certain buyers have the option to adjust deliveries between 10% to 20%. In general, except for the options of the buyers to decrease deliveries by a specified percentage, and except for force majeure events, the buyers either must take delivery and pay for the entire amount contracted for or, if delivery is refused on any portion of the contract, pay to the Company the difference between the minimum contract price and the amount received by the Company upon the sale of the uranium to a third party. Certain of the contracts also provide the buyer with options to renew beyond the periods reflected in the table.

Should any of the Company's customers be unable to perform its obligations to purchase and pay for the uranium because of force majeure or otherwise, this could have a material adverse effect on the Company's results of operations if the Company would not be able to sell such material under another long-term contract or in a spot market sale.

A significant portion of the Company's contracted sales of uranium from January 1, 1998 through December 31, 2002 are represented by nine long-term contracts with eight different customers, three of which represented 18%, 15% and 13% of sales for the year ended December 31, 1997 and five of which represented 20%, 16%, 15%, 12% and 11% of sales for the year ended December 31, 1996.

As of December 31, 1997, the Company had two outstanding long-term purchase contracts for Russian origin uranium totaling 90,000 pounds with deliveries in 1998. These contracts have a price escalation factor related to future inflation.

RESERVES

The following table sets forth the Company's total in-place proven and probable uranium reserves as of December 31, 1997. The reserves are generally based on estimated recovery factors of 65%-75%, certain cut-off grades and a price of $16 per pound.

Properties	Producing (P) / Development (D)	In-Place Reserves As of December 31, 1997		Recoverable Reserves as of December 31, 1997
		Proven	Probable	
		(Amounts in thousands of pounds of U308)		
Texas				
Kingsville Dome	P	1,053	2,212	2,607
Rosita	P	1,407	—	914
Vasquez	D	2,248	1,439	2,397
Alta Mesa	D	4,346	1,863	4,036
New Mexico				
Churchrock				
Section 8	D	6,529	—	4,244
Section 17	D	3,451	4,992	5,488
Mancos	D	4,164	—	2,707
Crownpoint	D	30,758	8,201	25,323
Santa Fe	D	1,418	13,306	9,571
TOTALS		54,374	32,013	57,287

The foregoing table does not include approximately 27.0 million pounds of proved and probable in-place reserves (estimated 17.6 million pounds recoverable) contained on acreage adjoining the Crownpoint property for which the Company executed leases with the landowners in 1992. These leases are subject to ratification by the U.S. Bureau of Indian Affairs (the "BIA"). See Item 2. Properties - New Mexico Development Properties - Crownpoint District.

THE ISL MINING PROCESS

The ISL mining process, a form of solution mining, differs dramatically from conventional mining techniques. The ISL technique avoids the movement and milling of significant quantities of rock and ore as well as mill tailings waste associated with more traditional mining methods and generally results in a more cost-effective and more environmentally-benign extraction operation in comparison to conventional uranium mining. Historically, the majority of U.S. uranium production resulted from either open pit surface mines or underground shaft operations. These conventional mining methods are, in many cases, capital and labor intensive and are not cost competitive with the majority of non-U.S. conventional producers.

The ISL process was first tested for the production of uranium in the mid-1960's and was first applied to a commercial-scale project in 1975 in South Texas. The ISL process had become well established in the South Texas uranium district by the late 1970's, where it was employed in connection with approximately twenty commercial projects, including two operated by the Company.

In the ISL process, groundwater fortified with oxygen and other solubilizing agents is pumped into a permeable ore body causing the uranium contained in the ore to dissolve. The resulting solution is pumped to the surface where the uranium is removed from the solution and processed to a dried form of uranium which is shipped to conversion facilities for sale to the Company's customers.

An ISL project involves several major components:

ORE BODY EVALUATION

Ore bodies which are currently being mined by the ISL process are associated with groundwater saturated permeable sandstone formations typically located between 100 and 2,000 feet below the surface. The uranium ore is deposited in a roll front configuration where the groundwater passing through the sandstone passes from a natural oxidizing environment to a naturally occurring reducing environment. This change causes the dissolved uranium in the groundwater to become insoluble, and it then attaches to the grains of the sandstone. Some important factors in evaluating an ore body for the ISL process are permeability, the thickness of the ore zone, depth, size, grade of ore, shape of the ore body, nature of uranium mineralization, host rock mineralogy, and the hydrology. These factors are important in determining the design of the wellfield, the type and flow of the leaching solution, and the nature of the surface ISL facilities.

WELLFIELD DESIGN

The wellfield is the mechanism by which the leaching solution, or lixiviant, is circulated through the ore body. The wellfield consists of a series of injection, production (extraction) and monitoring wells drilled in specified patterns. These patterns will vary primarily with the configuration of the ore and the hydrologic characteristics of each deposit. Determining the wellfield pattern is crucial to minimizing costs and maximizing efficiencies of production. Injection and production wells vary in diameter from four to six inches. Generally, these wells are drilled down to the bottom of the ore zone (through which the lixiviant must be circulated to achieve production). Injection and production wells are cased with polyvinyl chloride ("PVC") or fiberglass casings which are cemented in place from the bottom of the ore zone to the surface. The wells are then completed into the ore zone.

LIXIVIANT CHEMISTRY

The lixiviant, consisting of native groundwater fortified with an oxidant and an anionic complexing agent, is introduced via the injection wells to the ore bearing aquifer. The oxidant (gaseous oxygen) changes the uranium valence state making the uranium soluble in the lixiviant. The lixiviant (sodium bicarbonate) complexes the original uranium to a soluble ion, uranyl dicarbonate, which dissolves the uranium. The dissolved uranium then flows to the surface with the lixiviant fluid which is circulated through the ore body until economic recovery is achieved.

URANIUM RECOVERY PROCESS

The uranium recovery process consists of a lixiviant circuit, an elution/precipitation circuit and a drying and packaging process. The lixiviant circuit flows from the ore body, where the uranium is dissolved. The lixiviant stream is then circulated to an ion exchange column on the surface where uranium is extracted from the lixiviant by absorption onto the resin beads of the ion exchange columns. The lixiviant is then refortified and reinjected into the ore body. When the ion exchange column's resin beads are loaded with uranium, the loaded uranium is removed and placed into the elution circuit where the uranium is flushed with a salt water solution which precipitates the uranium from the beads. This leaves the uranium in a slurry, which is then dried and packaged for shipment as uranium powder.

The Company has historically utilized a central plant for the ion exchange portion of the production process. In order to increase operating efficiency and reduce future capital expenditures, the Company began the design and development of wellfield-specific remote ion exchange methodology. Instead of piping the solutions for miles through large diameter pipe lines and mixing the waters of several wellfields together, each wellfield will be mined using a dedicated satellite ion exchange facility. This will allow for ion exchange to take place in the wellfield instead of at the central plant.

Nominal design flow will be in the range of 1,200 gpm, about 25% of the design flow of the central plant at the Kingsville Dome project. Each of these units will consist of several ion-exchange columns and a resin transfer facility. When fully loaded with uranium, the resin will be transferred to a trailer and the resin trucked to the central plant for elution. After stripping the uranium from the resin, the resin will be transferred into the trailer and transported back to the satellite plant in the wellfield.

These satellite facilities will allow each wellfield to be mined using its own native groundwater only, thus eliminating the problems associated with progressive buildup of dissolved solids in the groundwaters and enhancing mining efficiencies and uranium recoveries.

WELLFIELD RESTORATION

At the conclusion of mining, the mine site is decommissioned and decontaminated and the well-field is restored and reclaimed. Wellfield restoration involves returning the aquifer to a condition consistent with its pre-mining use and removing evidences of surface disturbance. The restoration of the wellfield can be accomplished by flushing the ore zone for a time with native ground water and/or using reverse osmosis to remove ions, minerals and salts to provide clean water for reinjection to flush the ore zone. Decommissioning and decontamination of the mine site entails decontamination, dismantling and removal for disposal or reuse of the structures, equipment and materials used at the site during the mining and restoration activities.

ENVIRONMENTAL CONSIDERATIONS AND PERMITTING; WATER RIGHTS

The production of uranium is subject to extensive regulations, including federal and state (and potentially tribal) environmental regulations, that have a material effect on the economics of the Company's operations and the timing of project development. The Company's primary regulatory costs have been related to obtaining and complying with the regulatory licenses and permits that must be obtained from federal and state agencies prior to the commencement of uranium mining activities.

Environmental considerations include the prevention of groundwater contamination (through proper design and operation of the wellfield and monitoring wells to prevent the vertical or horizontal escape of leaching solution from the mining area) and the treatment and disposal of liquid and/or solid discrete surface waste or by-product materials (so-called "11e. (2) by-product material" under federal law). The majority of by-product material that is generated is liquid and generally is disposed of through underground injection wells, by a combination of reverse osmosis, brine concentration and evaporation or, after treatment, by surface deposition or discharge. Any such disposal must be approved by the governing authority having jurisdiction over that aspect of the Company's activities. Once mining is completed, the Company is required to reclaim the surface areas and restore underground water quality to the level of quality mandated by applicable regulations or license requirements. A small amount of solid discrete surface waste materials generated by the ISL process is disposed of by delivery to a licensed by-product material disposal site or to a licensed conventional uranium mill tailings pile. While such sites may not be readily available in the future, the Company believes that any increase in the cost of such disposal will continue to be insignificant relative to total costs of production and will not be a material portion of restoration/reclamation costs.

In both Texas and New Mexico there are two primary regulatory authorizations required prior to operations: a radioactive material license and underground injection control ("UIC") permits which relate both to the injection of water for production purposes and to the disposal of by-product material through underground injection wells. Uranium mining is subject to regulation by the U.S. Nuclear Regulatory Commission ("NRC") under the federal Atomic Energy Act ("AEA"); however, the AEA also allows for states with regulatory programs deemed satisfactory by the NRC to take primary responsibility for licensing and regulating certain activities, such as uranium recovery operations. When a state seeks this responsibility, it enters into an agreement with the NRC whereby the NRC agrees to recede from the exercise of most of its counterpart jurisdiction, leaving the matters to be administered by the state. Texas has entered into such an agreement; however, New Mexico is not a party to such an agreement.

The federal Safe Drinking Water Act ("SDWA") creates a nationwide regulatory program protecting groundwater which is administered by the U.S. Environmental Protection Agency ("EPA"). To avoid the burden of dual federal and state (or Indian tribal) regulation, the SDWA allows for the permits issued by the UIC regulatory programs of states and Indian tribes determined eligible for treatment as states to suffice in place of a UIC permit required under the SDWA. A state whose UIC program has been determined sufficient for this purpose is said to have been granted "primary enforcement responsibility" or "primacy," and a UIC permit from a state with primacy suffices in lieu of an EPA-issued permit, provided the EPA grants, upon request by the permitting state, an "aquifer exemption" or "temporary aquifer designation" modifying the permitting state's UIC program to recognize the temporary placement of mining fluids into the intended mining zone within the horizontal confines of the proposed mining area. Although the EPA's consent to aquifer exemptions or temporary aquifer designations for certain mineral deposits is often issued almost automatically, the EPA may delay or decline to process the state's application if the EPA questions the state's jurisdiction over the mine site. Both Texas and New Mexico have been granted "primacy" for their UIC programs, and the Navajo Nation has been determined eligible for treatment as a state but is not due to submit its program for EPA approval for several years. Until such time as the Navajo Nation has been granted "primacy," ISL uranium mining activities within Navajo Nation jurisdiction will require a UIC permit from the EPA. Despite some procedural differences, the substantive requirements of the Texas, New Mexico and EPA UIC programs are very similar.

In addition to its radioactive materials licenses and UIC permit, the Company is also required to obtain from appropriate governmental authorities a number of other permits or exemptions, such as for waste water discharge, land application of treated waste water, or for air emissions.

The current environmental regulatory program for the ISL industry is well established. Many ISL mines have gone full cycle through the permit-operating-restoration cycle without any significant environmental impact. However, the public anti-nuclear lobby can make environmental permitting difficult and permit timing less than predictable.

In Texas, the radioactive materials license required for ISL uranium mining is granted by the Texas Department of Health ("TDH") and the UIC permits are granted by the Texas Natural Resource Conservation Commission ("TNRCC"). The TNRCC also regulates air quality and surface deposition or discharge of treated waste water associated with the ISL mining process. In order for a licensee to receive final release from further radioactive materials license obligations after all of its mining and post-mining clean-up has been completed, approval must be issued by the TDH along with concurrence from the NRC.

In New Mexico, radioactive materials licensing is handled directly by the NRC, rather than by the State of New Mexico. Furthermore, depending upon whether a site located within New Mexico falls under state or Navajo Nation jurisdiction, the permitting of the UIC aspects of ISL mining may be conducted by either the New Mexico Environmental Department ("NMED") or the EPA or possibly both in case of jurisdictional conflict. The jurisdictional issue when raised as to any development property, could result in litigation between the state and the EPA, with the possibility of delays in the issuance of affected UIC permits.

Water is essential to the ISL process. It is readily available in South Texas for the Company's operations and obtaining water rights is not required because water is subject to capture. In New Mexico the use of water rights is administered through the New Mexico State Engineer subject to Indian tribal jurisdictional claims as discussed below. Obtaining new water rights, and the transfer or change in use of existing water rights are carefully and strictly regulated by the State Engineer. The State Engineer may also grant an application for a "temporary water right" which will not establish a vested right but may provide a sufficient quantity of water to fulfill the applicant's needs. The State Engineer exercises jurisdiction over underground water basins with "reasonably ascertainable boundaries." Accordingly, new appropriations or changes in purpose or place of use or points of diversion of existing water rights, such as those in the San Juan and Gallup Basins where the Company's properties are located, must be obtained by permit from the State Engineer. Applications are required to be published and are subject to hearing if protested. There are three criteria for decision, that the application: (1) not impair existing water rights, (2) not be contrary to the conservation of water within New Mexico, and (3) not be detrimental to the public welfare. Applications may be approved subject to conditions which govern exercise of the water rights. Appeals from decisions of the State Engineer are to the district court of the county in which the work or point of desired appropriation is situated and from there to the New Mexico Court of Appeals. Finally, jurisdiction over water rights may become an issue in New Mexico when an Indian nation, such as the Navajo Nation, objects to the State Engineer's authority to grant or transfer a water right or to award a temporary water right, claiming tribal jurisdiction over Indian country. This issue could result in litigation between the Indian nation and the state which may delay action on water right applications, and, depending on who prevails as to any particular property, could result in a requirement to make applications to the appropriate Indian nation and continuing jurisdiction by the Indian nation over use of the water. All of the foregoing issues arise to a greater or lesser extent in connection with the Company's New Mexico properties, as further described below.

There can be no assurance that the regulatory permits or licenses in Texas or New Mexico, or the applications for water rights in New Mexico, required for any project of the Company will be approved by the necessary governing authority in the form contemplated by management, or in any other form, or within the time periods necessary to commence timely production. Additionally, regulations and permit requirements are subject to revisions and changes which may materially affect the Company's operations. Any delay or failure in obtaining such permits or water rights could materially and adversely affect the business and operations of the Company.

In addition to the costs and responsibilities associated with obtaining and maintaining permits, and the regulation of production activities, the Company is subject to those environmental laws and regulations applicable to the ownership and operation of real property in general, including but not limited to the potential responsibility for the activities of prior owners and operators.

THE URANIUM INDUSTRY

GENERAL

The only significant commercial use for uranium is to fuel nuclear power plants for the generation of electricity. Nuclear plants generated approximately 17% of the world's electricity in 1996, up from less than 2% in 1970. According to the Uranium Institute ("UI"), through the year 2000 nuclear generating capacity is expected to grow at 1% per annum, primarily as a result of new reactor construction outside the United States and increased efficiencies of existing reactors. Prospects for growth beyond 2000 are good. Pressure to reduce greenhouse gases that are primarily caused by the burning of fossil fuels makes nuclear power generation an increasingly important energy source alternative to coal, oil or natural gas. In addition, new generation reactor designs are more standardized which could result in more predictable capital outlays, streamlined start up schedules and inherently safe operations.

As of November 30, 1997, there were 364 nuclear reactors operating in the Western World, 106 of which are in the United States and another 32 under construction outside of the United States. Estimates for uranium consumption by Western World commercial reactors was approximately 142 million pounds of uranium in 1997 representing an increase of 51% over the rate of consumption recorded for 1987. Western World consumption is estimated to range between 135 to 150 million pounds annually during the next five years.

MARKET PRICE FORMATION

1997 represented a volatile year in terms of price formation. At December 31, 1996, the spot price was $14.70 per pound compared to $12.05 per pound at December 31, 1997. The spot price recorded its low for the year of $10.20 at August 30, 1997 but rebounded $2.55 to $12.75 by November 30, 1997.

During May of 1996, spot prices reached a high of $16.50 per pound, a level which had not been reached since December of 1987, but began a slow decline from August 1996 to its current level ($10.75 per pound at February 28, 1998). The first half of 1996 was characterized by increased utility demand together with relatively illiquid inventories. As prices approached their highs for the year, more inventory became available and demand became satisfied at lower prices.

The heavy utility contracting in 1996 resulted in weakened contract demand during 1997 and thus weakening prices. (The volume of spot transactions world wide during the first quarter of 1997 was only 32% of that during the first quarter of 1996). In addition, aggressive selling by the Russian Executive Agent to fill portions of their allotted HEU derived uranium import quota led to a bottoming of prices in

August of 1997 of $10.20 per pound. Utility and producer demand entered at that time helping to fuel a quick recovery to $12.75 per pound at November 30, 1997.

The majority of uranium is sold under long-term contracts. However, the spot price affects the price level at which such long-term contracts can be attained. In rising markets, base price escalated contracts are sought by buyers while spot price related term contracts have been their preference during declining markets.

SOURCES OF SUPPLY

Western World production of uranium in 1996 reached 74 million pounds and is estimated to have increased to approximately 77 million pounds in 1997. Production at this level would represent approximately 54% of estimated consumption for that year. Since 1985 Western World consumption has outstripped Western World production by over 500 million pounds. This gap has been met through inventory drawdowns, imports of CIS uranium product and to a lesser extent, imports from China and former East Bloc countries. Liquidation of government stockpiles has also played a role since approximately 1995 and could be a more significant source of supply in the future.

Inventory Drawdowns: From the early 1970's to 1980, the Western World uranium industry was characterized by increasing uranium production, fueled by overly optimistic projections of nuclear power growth. From 1970 to 1985, production exceeded consumption by approximately 500 million pounds. By the end of 1985, enough inventory had been amassed to fuel Western World reactor needs for over five years. In response, sales of excess inventory followed and prices declined from highs of above $40.00 per pound to below $8.00 per pound in 1991. As prices fell, Western World production was reduced dramatically from a high of 115 million pounds in 1980 to a low of 57 million pounds by 1994. As production fell, consumption increased quickening the pace of commercial inventory drawdown. Currently it is estimated that excess inventory levels (levels in excess of preferred inventories) are less than two years of forward reactor requirements. Preferred inventories are by nature, a function of policy and price. In rising markets, consumers tend to build inventories as a hedge and in falling markets, tend to reduce inventories thereby reducing carrying costs. Both actions tend to exacerbate price movements.

CIS Imports: A rapid increase in the quantity of CIS imports beginning in the late 1980's significantly countered the effect of inventory drawdowns and led to the filing of an anti-dumping suit by the U.S. in late 1991. In October of 1992, suspension agreements were signed limiting CIS access to the U.S. market via strict quotas and anti- circumvention measures. Agreements with the primary uranium producing CIS republics remain in place through at least 2002.

Amendment to Russian Suspension Agreement: On March 11, 1994, the suspension agreement with Russia was amended allowing for up to 43 million pounds of uranium to be imported into the U.S. over ten years, only if it is matched with an equal volume of newly produced U.S. uranium. Although this amendment may increase the supply of uranium to the U.S. market place, it has proven to be an important program for most domestic producers.

CIS Production: Primary uranium production in Russia, Kazakhstan and Uzbekistan, the major CIS producing republics has declined steadily. In 1993, these republics produced a total of approximately 20 million pounds of uranium. By 1996, production had fallen to approximately 12.5 million pounds representing a 37% decline.

Highly Enriched Uranium: In January of 1994, the U.S. and Russia entered into an Agreement (the "Russian HEU Agreement"), to convert highly enriched uranium ("HEU") derived from dismantling Russian nuclear weapons into low enriched uranium ("LEU"), suitable for use in nuclear power plants. At a projected maximum conversion rate for HEU, approximately 24 million pounds of uranium could be available to Western World markets on an annual basis.

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Legislative Disposition of HEU: In 1996, the U.S. Congress passed legislation in compliance with the suspension agreements which allows the converted HEU material to be sold in the U.S. market place at an annual rate not to exceed 2 million pounds in 1998 increasing gradually to 20 million pounds in 2009 and thereafter. At this maximum rate, HEU material could supply approximately 51% of annual U.S. reactor requirements projected for 2009. In addition, HEU is allowed to be used in the U.S. as a source of Russian uranium for matching sales without reducing maximum quotas allowed under the legislation. This legislation also sets forth the procedures/restrictions on sales of U.S. government stockpiles including previously purchased Russian HEU and LEU and natural uranium inventories. The controlled disposition of these government stockpiles is designed to mitigate any adverse impact on the domestic uranium industry as determined by the Secretary of the United States Department of Energy (the "DOE").

Reprocessing: Reprocessing of spent nuclear fuel meets approximately 5-7 million pounds of Western World demand each year. This activity is primarily focused in Western Europe and Japan and it is not expected to increase significantly in the near future.

REQUIRED PRIMARY PRODUCTION

Industry analysts expect annual Western World consumption to range between 135 million and 150 million pounds annually for the near future. The Company estimates that between 30 million and 40 million pounds of this demand could be filled by a combination of government stockpiles (including converted Russian and United States HEU and inventory sold by the DOE), and imports from CIS republics and former East Bloc countries. To achieve market equilibrium, primary production in the Western World will need to supply between 95 million and 120 million pounds on an annual basis subject to adjustments for any remaining excess inventory drawdown and limited uranium reprocessing. Production from existing facilities in the Western World however, is projected to decline from current levels of 77 million to approximately 57 million pounds by 2001 as existing reserves are depleted. New production therefore will have to be brought on line to fill the potential annual gap of between 38 million and 63 million pounds. The Company believes that higher prices will be needed to support the required investment in new, higher cost production as lower cost production reserves are depleted.

The following table shows U.S. production and Western World production and consumption for the years presented.

PRODUCTION AND CONSUMPTION OF U3O8(1)
(Western World Countries)
(Amounts in millions of pounds of U3O8)

Year	Total U.S. Production	Total U.S. Consumption	Total Western World Production	Total Western World Consumption
1979	37.5	20.5	99.7	46.6
1980	43.7	18.8	115.0	41.0
1981	38.5	24.1	114.9	59.9
1982	26.9	24.3	107.8	69.8
1983	21.2	28.7	96.2	76.6
1984	14.9	27.0	101.0	78.4
1985	11.3	33.7	98.7	91.1
1986	13.5	34.9	96.7	97.9
1987	13.0	33.7	92.2	93.8
1988	13.1	39.9	95.5	108.2
1989	13.8	38.0	89.0	104.3
1990	8.9	44.2	73.8	114.0
1991	8.0	44.8	70.0	120.4
1992	5.6	45.2	60.9	123.3
1993	3.1	44.2	57.2	130.8
1994	3.4	40.4	57.8	135.7
1995	6.0	51.1	66.0	128.6
1996	6.3	45.5	74.0	130.7
1997 (est.)	5.8	53.1	77.0	142.1

(1) Source: Industry - various publications of Department of Energy/Energy Information Administration ("DOE/EIA"), Trade Tech, UxCo, the Uranium Institute and Nuclear Assurance Corporation.

URANIUM PRICES

Spot prices reflect the price at which uranium may be purchased for delivery within one year. Historically, spot prices have been more volatile than long-term contract prices, increasing from $6.00 per pound in 1973 to $43.00 per pound in 1978, then declining to a low of $7.25 per pound in October 1991. The spot price per pound as of February 28, 1998 was $10.75.

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The following graph shows spot prices per pound from 1978 to December 31, 1997, as reported by Trade Tech.

[GRAPH]

All prices beginning in 1993 represent the nonrestricted origin U_3O_8 deliveries available to U.S. utilities. Trade Tech began reporting a two-tier price structure soon after the United States and certain Republics of the CIS agreed to import restrictions on uranium produced. The foregoing prices reflect those prices available to U.S. utility consumers.

COMPETITION

The Company markets uranium to utilities in direct competition with supplies available from various sources worldwide. The Company competes primarily on the basis of price. The Company estimates that for 1997 its uranium production was approximately 15% of the total U.S. production and approximately 2% of the total Western World production.

ITEM 2. PROPERTIES.

SOUTH TEXAS PRODUCING PROPERTIES

The Company currently has two producing properties which are located in South Texas, Rosita and Kingsville Dome. The following is a description of those properties.

KINGSVILLE DOME

The Property. The Kingsville Dome property consists of mineral leases from private landowners (and a small portion owned in fee) on 3,068 gross (3,043 net) acres located in central Kleberg County, Texas. The leases provide for royalties based upon uranium sales. The leases have expiration dates ranging from February 1998 to 2007. With a few minor exceptions, all the leases contain shut-in royalty clauses which permit the Company to extend the leases not held by production by payment of a royalty.

Reserves. As of December 31, 1997, the property contained approximately 3.3 million pounds of in-place proven and probable uranium reserves (estimated 2.6 million pounds recoverable).

Production History. Initial production commenced in May 1988. In May 1989, due to the continuing decline in the spot price of uranium, the Company deferred development of the next wellfield, and the plant was shut-in in September 1990. Total production from May 1988 through September 1990 was approximately 1.5 million pounds.

Wellfield development activities resumed in December 1995, and production commenced in March 1996. Production at Kingsville Dome was approximately 1.5 million pounds from recommencement of production in March 1996 through December 31, 1997 with 640,000 pounds produced in 1997.

Further Development Potential. As part of the Company's ongoing production activities, it is engaged in significant development and exploration efforts at Kingsville Dome. Exploration is planned northwest of the current production area in 1998. The Company spent approximately $9.0 million in capital expenditures in 1997 and anticipates spending approximately $4.3 million in 1998 for plant capital, permitting, development and land holding costs.

Permitting Status. Radioactive material licensing and UIC permit hearings for currently producing areas have been completed, and the necessary permits have been issued. Some minor amendments to the license and permit for further production within the permit area will be required as development proceeds. The term of the license and UIC permit is effectively open-ended. The UIC disposal permit will require renewal in mid-1998, and the Company is in the process of applying for that renewal.

Restoration and Reclamation. Restoration of groundwater is planned to commence in early 1998. The Company anticipates spending approximately $430,000 in 1998 on such restoration activities.

ROSITA

The Property. The Rosita property consists of mineral leases on 3,359 gross and net acres located in northeastern Duval County, Texas. All the leases, except minor leases, are held by production. The leases provide for royalties based upon uranium sales.

Reserves. As of December 31, 1997, the property contained approximately 1.4 million pounds of in-place proven and probable uranium reserves (estimated 900,000 million pounds recoverable).

Production History. The Company began initial production at Rosita in October 1990. Total production from Rosita for the eighteen months through March 31, 1992 was approximately 1.1 million pounds. In March 1992, due to depressed uranium prices, the Company shut-in production.

Wellfield development activities resumed at Rosita in March 1995, and production recommenced in June 1995. From that date through December 31, 1997 approximately 1.3 million pounds were produced with 230,000 pounds produced in 1997.

Further Development Potential. The Company estimates that there are approximately 900,000 pounds of uranium remaining to be produced from the Rosita project. The Company expects its existing reserves at Rosita to continue in production beyond 1999. The Company spent approximately $2.5 million for development activities, permitting and land holding costs in 1997 and projects expenditures of over $750,000 in 1998.

Permitting Status. Radioactive materials licensing and UIC permit hearings for currently producing areas have been completed, and the necessary permits have been issued. Some minor amendments for further production within the permit area will be required as development proceeds. The term of the license and UIC permit is effectively open-ended.

Restoration and Reclamation. The Company expects to commence initial groundwater restoration in early 1998 and expects to expend approximately $100,000 in 1998 on such activities.

SOUTH TEXAS DEVELOPMENT PROPERTIES

VASQUEZ

The Property. The property consists of two mineral leases on 842 gross and net acres located in southwestern Duval County, Texas. One lease expires in January 1999, subject to extension for permitting delays, and the other lease expires in February 2000. The leases provide for royalties based on uranium sales. A potential conflict with respect to the mineral rights which had arisen on the Vasquez property regarding a party who owns 50% of the mineral estate has been substantially concluded and such party has disclaimed its interest in the uranium on this property. The Company leases are with the owner of both the surface of the land and 50% of the minerals. As a result of these leases, the Company has the right to mine 100% of the minerals on this property .

Reserves. As of December 31, 1997, the property contained approximately 3.7 million pounds of in-place proven and probable uranium reserves (estimated 2.4 million pounds recoverable).

Development Plan. Production is targeted to commence in late 1998 or early 1999. The Company spent approximately $400,000 in capital expenditures in 1997 and anticipates spending approximately $440,000 in 1998 for permitting, development and land holding costs. The Company anticipates having to demonstrate financial surety in connection with the commencement of production at this project which it expects to meet by posting a bond collaterized by cash in an amount equal to 50% of the bond.

Permitting Status. All of the required permit applications have been completed and submitted to the TNRCC and the TDH. These applications are currently under review and the Company expects the permits to be in place in 1998.

ALTA MESA

The Property. The Alta Mesa property consists of 4,575 gross and net acres located in Brooks County, Texas. The Company has a single mineral lease from the private mineral owner. The lease provides for a royalty based upon uranium sales and requires payment of minimum annual royalties if production does not begin by certain specified times. The Company made such a payment in 1997. The Company paid $4 million for the lease of which $1 million is recoverable against one-half of future royalties. The lease term ends in December 1999 unless production from the property commences by that date (subject to extension for permitting delays).

Reserves. As of December 31, 1997, the property contained approximately 6.2 million pounds of in-place proven and probable reserves (estimated 4.0 million pounds recoverable).

Development Plan. Construction of the plant and wellfields is projected to take eight months and is anticipated to begin in the fourth quarter of 1998 depending on the progress in licensing and permitting. The Company spent approximately $515,000 in 1997 for permitting and land holding costs and anticipates spending approximately $680,000 in 1998 for plant

construction, permitting and development costs. The

Company anticipates having to demonstrate financial surety in connection with these activities which it expects to meet by posting a bond collaterized by cash in an amount equal to 50% of the bond.

Permitting Status. The Company filed license applications in the fourth quarter of 1996 and anticipates having the final permits in place in the latter part of 1998.

NEW MEXICO DEVELOPMENT PROPERTIES

GENERAL

The Company has various interests in properties located in the Churchrock and Crownpoint districts in New Mexico. As to these properties, the Company holds both patented and unpatented mining claims, mineral leases and some surface leases from private parties, the Navajo Nation and Navajo allottees. In addition, in March 1997, the Company acquired from Santa Fe certain uranium mineral interests and exploration rights for uranium on significant acreage in New Mexico, a small portion of which falls within the Churchrock district.

In keeping with its overall corporate strategy, the Company's development plan for its New Mexico properties will proceed incrementally, subject to timely permitting, the availability of water rights, the availability of sales contracts and the availability of capital. The Company plans to develop the Churchrock district first and the Crownpoint district next.

REGULATORY FRAMEWORK

NRC License. In New Mexico, uranium production requires a radioactive materials license issued by the NRC. The Company has applied for one NRC license covering all properties located in both the Churchrock and Crownpoint districts (except the Mancos property) and has included the properties in both districts (except the Mancos leases) under one Final Environmental Impact Statement (FEIS) which is a prerequisite for the NRC license.

The NRC has finalized and completed the publication of the FEIS in the first quarter of 1997. The NRC issued an operating license in January 1998 which would allow operations to begin in the Churchrock district, however, the effective date of the license has been temporarily stayed pending a decision by the NRC. As a result of the current stay in place, there can be no assurance that the license will be maintained in its current form allowing the Company to proceed with its planned operations or that the NRC process will be concluded on a timely basis.

UIC Permit. NMED has jurisdiction under the New Mexico Water Quality Act to regulate UIC activities within the State of New Mexico, and the New Mexico UIC program has received "primary enforcement responsibility" from the EPA under the federal SDWA. However, by the terms of regulations issued by the EPA and the primacy determination made for the State of New Mexico, New Mexico's UIC primacy does not extend to New Mexico's exercise of UIC regulation or permitting over facilities located on "Indian lands," a term whose geographic reach the EPA has defined as coextensive with that of "Indian country". Because even a permit issued by a state holding UIC primacy cannot suffice in lieu of a federal UIC permit issued under the SDWA unless the EPA issued a corresponding aquifer exemption or temporary aquifer designation, the EPA's opinion that a site lies within Indian country virtually compels a state UIC applicant to secure an EPA UIC permit for UIC activities to be conducted on such a site.

In addition to the EPA's assertions, the Navajo Nation claims regulatory jurisdiction over a significant portion of the Company's New Mexico development properties. These claims subject the development of those properties within the area claimed as "Indian country" to further uncertainties, including a potential for delays in UIC permitting. For certain properties not permitted by the EPA at the time a Navajo regulatory program is promulgated and accepted by the EPA for a determination of primacy, the Company would then apply to the Navajo EPA for its UIC permits. Although a Navajo UIC program may adopt unique application, permitting, and enforcement procedures, it would, nonetheless, be required to impose virtually the same substantive requirements as the Company is prepared to satisfy under existing New Mexico and EPA UIC programs.

This dispute over UIC jurisdiction is currently focused on a portion of the Churchrock and Crownpoint properties. Despite this current jurisdictional dispute among the EPA, the State of New Mexico, and the Navajo Nation, the Company maintains good relations with the State of New Mexico, the Navajo Nation, and the EPA. However, there can be no assurance that the jurisdictional dispute will not have a material adverse effect on the Company's development plans in New Mexico.

In February 1998, the United States Supreme Court in Alaska v. Native Village of Venetie Tribal Government interpreted the terms "Indian country" and "dependent Indian Communities". Such interpretation stated that "Indian country" includes "all dependent Indian communities within the United States" and that such lands refer to a specific category of Indian lands that are not reservation nor allotted lands. Such lands must meet the following two criteria; (i) they must have been set aside by the Federal Government for the use of Indians as Indian land; and (ii) they must be under federal superintendence. On the basis of this ruling the Company believes that its private fee lands and federal claims positions in New Mexico may fall under the jurisdiction of the State of New Mexico for regulatory purposes.

Water Rights. For general information on water rights in New Mexico, see "Business-Environmental Considerations and Permitting; Water Rights."

CHURCHROCK DISTRICT

The Property. The Churchrock properties encompass 2,225 gross and net acres and include mineral leases, patented mining claims and unpatented mining claims. The properties are located in McKinley County, New Mexico, and consist of three parcels, known as Section 8, Section 17 and Mancos. None of these parcels lies within the area generally recognized as constituting the Navajo Reservation. The Company owns the mineral estate in fee for both Sections 17 and the Mancos properties. The surface estate on Section 17 is owned by the U.S. Government and held in trust for the Navajo Nation. The Company owns patented and unpatented mining claims on Section 8. The Company is obligated to pay certain royalties based on uranium sales. The unpatented claims currently require an annual payment of $100 per claim payable to the Bureau of Land Management to remain in full force and effect and are subject to certain overrides. On March 25, 1997, the Company acquired from Santa Fe, the fee mineral interests in Section 17 and Mancos thereby acquiring the position owned by the lessor and extinguished certain of the royalty obligations on those properties.

Reserves. As of December 31, 1997, Section 8 contained approximately 6.6 million pounds of in-place proven and probable uranium reserves (estimated 4.2 million pounds recoverable), Section 17 contained approximately 8.4 million pounds of in-place proven and probable uranium reserves (estimated 5.5 million pounds recoverable), and the Mancos property contained approximately 4.2 million pounds of in-place proven and probable uranium reserves (estimated 2.7 million pounds recoverable).

Development Plan. The New Mexico properties will be developed in accordance with the licenses issued by the NRC. It is anticipated that the first property to be licensed will be Churchrock. Costs related to permitting activities and land holding costs were approximately $1.0 million in 1997. The Company anticipates spending approximately $320,000 in 1998 for permitting and land holding costs. The Company anticipates having to demonstrate financial surety in connection with production activities which it expects to meet by posting a bond collaterized by cash in an amount equal to 50% of the bond.

Exploration Potential. The measured in-place reserves in Sections 8 and 17 and Mancos encompass only a small portion of the properties owned by the Company. The Company believes that substantial additional mineralization exists on these properties. Because of greater depths, this mineralization is estimated to be recoverable at a higher cost and accordingly require higher uranium prices to make them economical to produce.

Water Rights. The Company originally acquired mineral leases on Sections 8 and 17 from United Nuclear Corporation ("UNC") and, in connection therewith, acquired certain rights to use water from UNC. An application to use one of these rights has been the subject of extensive administrative proceedings and litigation with the New Mexico State Engineer and the Navajo Nation over the nature and extent of UNC's water rights. The State Engineer determined that the consumptive use and diversion amount UNC originally sought to transfer for use by the Company were in excess of the rights held by UNC and denied the application on the grounds that the UNC rights were insufficient to support the Company's mining operations. The Company has since reapplied and revised its water budget to be consistent with the rights of UNC as determined by the State Engineer. The State Engineer is currently conducting a hearing regarding the application for the transfer of the water rights. A claim by the Navajo Nation to jurisdiction over these water rights was denied by the State Engineer's hearing officer and in the prior proceeding, the state district court. These decisions do not preclude a contrary claim from being made in another proceeding.

Permitting Status. On June 21, 1989 the EPA issued its aquifer exemption covering that portion of the Churchrock site known as Section 8, and on November 1, 1989, NMED issued its permit, covering UIC activities on Section 8. On October 7, 1994, NMED issued an amended permit covering UIC activities on both Section 8 and Section 17. The permit for Section 17 was contested by the Navajo Nation which claimed UIC regulatory jurisdiction over the site, based on the fact that the surface estate is owned by the Navajo Nation. The EPA, acting as an advocate for the Navajo Nation, has asserted the Navajo Nation's claim and has refused to amend its previously issued aquifer exemption covering Section 8 to add the portion of the Churchrock facility on Section 17. The Navajo Nation has asserted jurisdiction over Section 8 as being a "dependent Indian community". The EPA has informed the Company that the regulatory jurisdiction of the property is considered to be in "dispute" and would require an EPA-issued permit prior to the commencement of mining. The Company does not plan to pursue permits for Mancos at this time.

In June 1996, the Company filed with the NMED two applications to renew the permit in two distinct parts, one covering the Section 8 portion and the other the Section 17 portion of Churchrock. This was to assure that the Company maintained a "clear" UIC authorization on the Section 8 portion of the site. The surface estate on Section 8 is not owned by the Navajo Nation or Navajo allottees. Because the renewal application was timely filed, the permit covering the Section 8 property has remained continuously in effect pending final determination on the renewal application by the NMED. The Navajo Nation has recently asserted jurisdiction over the UIC for Section 8, claiming that the land lies within a "dependent Indian community." While the EPA has not yet taken a final position on this issue, they have determined that a dispute does exist between the NMED and the Navajo tribe. As a result of this dispute, the EPA has indicated that an EPA permit will be required on this property. This situation could potentially delay or obstruct development of Section 8. The renewal application pertaining to the Section 17 property will be subject to a new administrative review which will ultimately require EPA to re-examine the jurisdictional status. The State of New Mexico has filed suit for a declaration of UIC jurisdiction over the site. The outcome of this suit may ultimately affect UIC jurisdiction on all Indian lands.

CROWNPOINT DISTRICT

The Property. The Crownpoint properties are located in the San Juan Basin, 22 miles northeast of the Company's Churchrock deposits and 35 miles northeast of Gallup, New Mexico, adjacent to the town of Crownpoint. The Properties consist of 1,578 gross and net acres, as follows:

(a) 162 gross and net acres on Section 24. The Company has

100% of the mineral estate on this acreage pursuant to a combination of a 40% fee interest, a mineral lease on the other 60% of the mineral estate unpatented mining claims. This acreage is subject to an obligation of the

Company to pay a production payment on the first 50,000 pounds of uranium produced and an override based on uranium sales;

(b) 959 gross and net acres on Sections 19 and 29 pursuant to a lease from private mineral owners (expiring August 2007) which provides for royalties and an override based on uranium sales; and

(c) 457 gross and net acres of unpatented mining claims in Sections 9, 24 and 25.

In addition to the foregoing, the Company has 1,440 gross and net acres of mineral leases (hereinafter referred to as "Unit 1") from Navajo allottees who are the beneficial owners of the surface and mineral rights. The leases are subject to approval by the Bureau of Indian Affairs (the "BIA"). The BIA Area Director is expected to approve the leases after completion of the license. These leases expire 10 years after the approval by the BIA.

Reserves. With respect to all the Crownpoint acreage except Unit 1, as of December 31, 1997, the property contained approximately 39.0 million pounds of in-place proven and probable reserves (estimated 25.3 million pounds recoverable). The Company estimates that Unit 1 contains approximately 27.0 million pounds of in-place proven and probable reserves (estimated 17.6 million pounds recoverable). The Unit 1 reserves are not included as part of the Company's reserve base.

Development Plan. The New Mexico properties will be developed according to the license conditions issued by the NRC. Under the license, the first operating property will be Churchrock followed by Unit 1 and Crownpoint. Costs relating to permitting activities and land holding costs for Crownpoint were $1,153,000 in 1997, and are expected to total $210,000 in 1998.

Water Rights. With respect to Crownpoint, the Company has acquired three applications for appropriations of water which give the Company the first three "positions in line" on the hearings list for the San Juan Basin. Certain aspects of all three applications were protested and are subject to hearings. Water rights relating to Unit 1 may likely involve the claim of the jurisdiction of the Navajo Nation, and this jurisdictional issue might also be present for other parts of Crownpoint. The Company plans to proceed with water rights for Crownpoint at a future date.

Permitting Status. The NRC license is part of the overall development plan for both the Churchrock and Crownpoint districts discussed above. The Company has recently submitted a revised UIC permit application for Section 24. There can be no assurance that the UIC permit will be granted. The surface estate on Section 19 and 29 is owned by the U.S. Government and held in trust for the Navajo Nation and may be subject to the same jurisdictional dispute as for Section 17 in Churchrock.

SANTA FE PROPERTIES

GENERAL

In March 1997 the Company acquired from Santa Fe certain uranium mineral interests and exploration rights for uranium in New Mexico.

The Properties. The properties consist of: (a) 37,000 acres as to which the Company has acquired a fee interest in the entire mineral estate, excluding coal ("Category I Properties"); (b) approximately 140,000 acres as to which the Company has acquired the fee interest in uranium (the "Category II Properties"); and (c) approximately 346,000 acres as to which the Company has acquired the exclusive right to explore for uranium and other minerals excluding coal (the "Category III Properties").

The Company is obligated to spend on exploration $200,000 per year for the ten year period starting in March 1997 and $400,000 per year for the seven year period starting in March 2007. This expenditure can be made on any of the Category II or Category III properties.

The license is for 17 years, expiring in March 2014. In the event that the sale price of uranium shall exceed $25 per pound for any twelve-month period URI has committed to spend on exploration (or pay to Santa Fe) during the following 5 years an aggregate of $5 million; and in the event that the sale price of uranium shall exceed $30 per pound for any twelve-month period URI has committed to spend on exploration (or pay to Santa Fe) during the following 5 years an aggregate of $10 million.

With respect to Category II and Category III properties, at such time as URI shall apply for a mining permit with respect to any such properties Santa Fe has the right to put the remaining mineral interests owned by it (excluding coal) to the Company at a price of $200 per acre for any acreage in any section which is covered by the mining application. The acreage price shall be increased by the same percentage as the percentage increase in the price of uranium on the date of such application over $15.80 per pound. URI has the option to purchase at any time the entire mineral estates (excluding coal) on such properties on the same terms.

Reserves. The Company estimates that the Category I Properties contain 14.7 million pounds of proven in-place uranium reserves (estimated 9.6 million pounds recoverable).

Development Plan. The planned development strategy is to integrate qualified properties from the Santa Fe lands into the production plans for Churchrock and Crownpoint.

Exploration Potential. There is significant exploration potential for the Santa Fe properties. Numerous ore grade holes drilled on the properties demonstrates this potential; however, because the deposits are not delineated, development costs are uncertain.

RECLAIMED PROPERTIES

The Company has completed production and groundwater restoration on its Benavides and Longoria projects in South Texas. The Company is currently completing the final stages of surface reclamation on these projects which the Company believes will not involve material expenditures.

On August 28, 1995, Manuel T. Longoria, as owner of the ranch containing the site of the Company's Longoria mine, brought suit against the Company in state district court in Duval County, Texas, asserting claims said to have arisen at various times over the last eighteen years. See "Business-Legal Proceedings."

The Company acquired the Section 17 leases in the New Mexico Churchrock district from United Nuclear Corporation ("UNC"). UNC had conducted underground mining for uranium on Section 17 and had reclaimed these properties. In connection with the acquisition, the Company assumed any liability of UNC for any remaining remediation work that might be required. NMED has not determined what, if any, additional remediation will be required under the New Mexico Mining Act. If more remediation work is required, the Company believes it will not involve material expenditures.

RECLAMATION AND RESTORATION COSTS AND BONDING REQUIREMENTS

Upon completion of production from a wellfield, the Company is obligated under state and federal law to restore the aquifer to a condition consistent with its pre-mining use. This involves restoration of the aquifer, plugging and abandoning the injection and production wells and reclaiming the surface. With

respect to operations at Kingsville Dome and Rosita, as well as reclamation and restoration of the Benavides and Longoria projects, the TNRCC requires the Company to provide financial surety to cover the costs of such restoration and reclamation. The surety bond requirement at December 31, 1997 was approximately $5.6 million. The Company fulfills this requirement through the issuance of surety bonds from the United States Fidelity and Guaranty Company ("USF&G") and has deposited as collateral for such bonds cash of approximately $3.3 million. The Company is obligated to fund the cash collateral account with an additional $0.50 for each pound of uranium production until the account accumulates an additional $1.0 million. The Company estimates that its future reclamation liabilities with respect to current operations at December 31, 1997 approximates $4.7 million, which has been charged to earnings. These financial surety obligations are reviewed and revised annually by the TNRCC.

The Company anticipates that it will be required to provide financial surety of approximately $3.0 million as a condition to receipt of the requisite permits for the mining of each of the Alta Mesa and Vasquez projects. The Company anticipates that USF&G or other bonding entities will provide the requisite bond under arrangements similar to those in place for Rosita and Kingsville Dome.

In New Mexico surety bonding will be required prior to development of the properties. The Company anticipates that it will be required to provide financial surety as a condition to receipt of the requisite permits for the Churchrock project which it anticipates will be provided by USF&G, or other bonding entities under arrangements similar to those in place for Rosita and Kingsville Dome. The amount of the surety bond will be subject to annual review and revision by the NRC and State of New Mexico.

ITEM 3. LEGAL PROCEEDINGS

LONGORIA

On August 28, 1995, Manuel T. Longoria, as owner of the ranch containing the site of the Company's Longoria mine near Bruni in Duval County, Texas, brought suit against the Company in state district court in Duval County, Texas asserting claims said to have arisen at various times over the last 18 years. In the action styled Longoria v. Uranium Resources, Inc., et al., Longoria claims the Company has leased the site knowing that the proposed mining would contaminate the site; that the Company had knowingly or negligently conducted mining operations in a manner which contaminated the Longoria property with toxic and hazardous material which present a serious health hazard. The suit asks for remediation of the Longoria property and for unspecified actual and punitive damages.

With regard to the claim for remediation, the Company, upon the conclusion of mining at the Longoria site and the nearby sites, began reclamation in the manner required by its permits and by state and federal regulations. Such reclamation has been completed and the Company has made application to the TDH for final release of its obligations on the property and anticipates to receive such release in early 1998.

The suit is pending at March 31, 1998 and the Company does not believe the conclusion of this lawsuit will have a material operating or financial impact on the Company.

PROBANK

On July 12, 1995, the Company filed a lawsuit in the federal district court in Colorado against Professional Bank, a Colorado chartered bank ("ProBank"). In the action styled Uranium Resources, Inc. v. Professional Bank, the Company alleged that ProBank transferred $1,080,000, without the Company's authorization, from the Company's account at ProBank to the accounts maintained at ProBank of various entities and an individual affiliated with Oren L. Benton. The Company recovered $300,000 of the total in 1995 and recovered

$575,000 from ProBank in June 1997 in settlement of the action against ProBank.

BENTON BANKRUPTCY

During 1994, the Company encountered liquidity problems that resulted in the Company entering into certain transactions with companies controlled by Mr. Benton (the "Benton Companies"). On February 23, 1995, Benton and various of the Benton Companies filed for protection under Chapter 11 of the Federal Bankruptcy Code (the "Benton Bankruptcy"). On February 19, 1998, David J. Beckman, as Liquidating Trustee for the CSI Liquidating Trust and the NTC Liquidating Trust commenced an action against the Company in the United States Bankruptcy Court for the District of Colorado seeking to recover certain transfers made from CSI Enterprises, Inc. ("CSI") and Nuexco Trading Corporation ("NTC") to the Company. The Adversary Proceeding is styled David J. Beckman v. Uranium Resources, Inc., Adversary Proceeding No. 98- 1131 SBB ("Adversary Proceeding"). Specifically, the Liquidating Trustee seeks to recover (a) $1,400,000 paid by NTC to the Company on or about November 7, 1994 and (b) transfers by CSI to the Company of $80,000 (12/2/94), $40,000 (12/9/94), $45,000 (12/16/94), $36,150 (2/10/95) and $1,900 (2/14/95). The Liquidating Trustee seeks to recover these amounts pursuant to 11 U.S.C. Section 547, 11 U.S.C. Section 544(b), 11 U.S.C. Section 550 and state law. The Company has not yet responded to the Adversary Proceeding. The Company intends to vigorously defend this action. The Company is unable to assess what adverse consequences, if any, might result from such assertion.

The Company has asserted certain claims against Benton and the Benton Companies in the bankruptcy proceedings.

The Company is subject to periodic inspection by certain regulatory agencies for the purpose of determining compliance by the Company with the conditions of its licenses. In the ordinary course of business, minor violations may occur, however, these are not expected to cause material expenditures.

ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS.

The 1997 Annual Meeting of Stockholders was held on May 1, 1997, in Dallas, Texas. Shares representing 9,303,484 votes (86% of total outstanding) were present in person or by proxy.

At the meeting, the Stockholders of the Company elected Leland O. Erdahl, Paul K. Willmott, George R. Ireland and James B. Tompkins to the Board of Directors for a one-year term. In addition, the Company's stockholders ratified Arthur Andersen LLP as independent accountants for the Company in 1997. The ratification of Arthur Andersen LLP as independent accountants was approved by a vote of 9,276,570 shares in favor, 2,216 opposed and 24,788 abstaining.

CAUTIONARY STATEMENT FOR THE PURPOSES OF THE "SAFE HARBOR" PROVISIONS OF THE PRIVATE SECURITIES LITIGATION REFORM ACT OF 1995

The Company is including the following cautionary statement to take advantage of the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995 for any forward-looking statement made by, or on behalf of, the Company. The factors identified in this cautionary statement are important factors (but not necessarily all of the important factors) that could cause actual results to differ materially from those expressed in any forward-looking statement made by, or on behalf of, the Company. Where any such forward-looking statement includes a statement of the assumptions or bases underlying such forward-looking statement, the Company cautions that, while it believes such assumptions or bases to be reasonable and makes them in good faith, assumed facts or bases almost always vary from actual results, and the differences between assumed facts or bases and actual results can be material, depending upon the circumstances. Where, in any forward-looking statement, the Company, or its management, expresses an expectation or belief as to the future results, such expectation or belief is expressed in good faith and believed to have a reasonable basis, but there can be no assurance that the statement of expectation or belief will result, or be achieved or accomplished. Taking into account the foregoing, the following are identified as important risk factors that could cause actual results to differ materially from those expressed in any forward-looking statement made by, or on behalf of, the Company:

CONTINUING SIGNIFICANT CAPITAL REQUIREMENTS

An ISL mining operation requires a substantial amount of capital prior to the commencement of, and in connection with, production of uranium, including costs related to acquiring the rights to mine uranium, securing regulatory permits and licenses, exploration and definitional drilling to determine the underground configuration of the ore body, designing and constructing the uranium processing plant, drilling and developing in order to establish the infrastructure for the production wells for each wellfield and complying with financial surety requirements established by various regulatory agencies regarding the future restoration and reclamation activities for each property.

The Company expects to fund its 1998 capital requirements from cash flow from operations and existing working capital financing arrangements. However, certain capital requirements for new development projects in 1998 and beyond may require additional sources of capital. There can be no assurance that the Company will raise sufficient capital to fund these capital requirements.

POTENTIAL ADVERSE EFFECT OF FEDERAL AND STATE REGULATIONS

The development and production of uranium is subject to extensive governmental regulations that materially affect the economics of the Company's operations and the timing of project development. To produce uranium, the Company must secure and maintain multiple permits, obtain adequate water rights and comply with extensive federal, state and potential tribal regulations for environmental protection, including regulations relating to air and water quality, the prevention of groundwater contamination, the reclamation and restoration of wellfield aquifers and the treatment, transportation and disposal of liquid and/or byproduct material and solid wastes generated by the Company's uranium mining and processing activities. To date, the Company's operations have not been materially and adversely affected by the inability to obtain or maintain required permits or water rights, or by any groundwater contamination or the disposal of waste or byproduct material. However, should the Company be unable to obtain or maintain permits or water rights for development of its properties or otherwise fail to adequately handle future environmental issues, the Company's operations could be materially and

adversely affected by expenditures or delays in the Company's ability to initiate or continue production at its properties.

The Company must obtain all necessary permits from the appropriate governmental agency before it can commence production at any of its development properties. The Company's future production is highly dependent on its ability to bring these development properties into production. Applications for permitting of certain of these properties have been filed. There can be no assurances that all the necessary permits will be obtained or that such permits will be obtained in a timely manner. Any significant delays in obtaining the necessary permits could have a material adverse effect upon the Company and its developmental plans for these properties.

The Company has expended significant resources, both financial and managerial, to comply with environmental protection laws, regulations and permitting requirements and anticipates that it will be required to continue to do so in the future. Although the Company believes its producing properties comply in all material respects will all relevant permits, licenses and regulations pertaining to worker health and safety as well as those pertaining to the environment, the historical trend toward stricter environmental regulation may continue. The uranium industry is subject to not only the worker health and safety and environmental risks associated with all mining businesses, but also to additional risks uniquely associated with uranium mining and processing. The possibility of more stringent regulations exists in the areas of worker health and safety, the disposal of wastes and byproduct material, the decommissioning, decontamination and reclamation of mining, milling, refining and conversion sites, and other environmental matters, each of which could have a material adverse effect on the costs or the viability of a particular project.

The Company is required to provide financial surety to state environmental agencies for plugging wells, groundwater restoration and site decommissioning, decontamination and reclamation. The Company estimates that its current restoration, decommissioning, decontamination and reclamation costs are approximately $4.7 million, which amount the Company has accrued as a liability on its financial statements. The Company satisfied its financial surety requirements imposed by environmental regulators with surety bonds totaling approximately $5.6 million at December 31, 1997, $3.3 million of which is collateralized by the Company with cash. The Company anticipates that its future financial surety requirements will increase significantly as production from the Company's producing sites continues and as future development and production occurs at additional sites in Texas and New Mexico. The amount of the financial surety for each producing property is subject to annual review and revision by regulators. There can be no assurance that the Company will have sufficient capital to meet these future financial surety obligations.

RESERVE ESTIMATES

Reserve estimates are necessarily imprecise and depend to some extent on statistical inferences drawn from limited drilling, which may prove unreliable; and there can be no assurance that the indicated level of recoveries will be realized. Should the Company encounter mineralization or formations at any of its mines or projects different from those predicted by drilling, sampling and similar examinations, uranium reserve estimates may have to be adjusted and mining plans may have to be altered in a way that could adversely affect the Company's operations. Moreover, short-term operating factors relating to the uranium reserves, such as the need for sequential development of ore bodies and the processing of new or different uranium grades, may adversely affect the Company's profitability in any particular accounting period.

NEED TO REPLACE RESERVES

The Company's producing uranium mines are, in general, characterized by a series of individual wellfields that produce at differing declining production rates. Each wellfield's production decline rate depends on ore reserve characteristics, and, in the case of the Company, varies from a steep decline rate of six months, to a relatively slow production decline rate of eighteen months. The Company's future uranium reserves and production, and therefore cash flow and income, are highly dependent upon the Company's level of success in exploiting its current reserves and acquiring or developing additional reserves. Reserves at the Company's currently producing sites are expected to be depleted in 1999.

although there is the potential for developing additional wellfields at Kingsville Dome. There can be no assurance that the Company's development properties will be placed into production or that the Company will be able to continue to find and develop or acquire reserves.

COMPETITION

There is global competition in the uranium industry for mineral properties, capital, customers and the employment and retention or qualified personnel. In the production and marketing of uranium concentrates there are approximately 15 major uranium-producing entities, some of which are government controlled and some of which are significantly larger and better capitalized than the Company.

The Company competes with larger producers in Canada, Australia and Africa, as well as with other United States ISL producers of uranium and other producers that recover uranium as a by-product of other mineral recovery processes. The Company also expects to compete with uranium recovered from the de-enrichment of highly enriched uranium obtained from the dismantlement of U.S. and Russian nuclear weapons and sold in the market by the United States Enrichment Corporation and/or the United States Department of Energy, as well as from imports to the United States of uranium from the CIS. The amount of uranium produced by competitors or imported into the United States may have a material impact on uranium prices.

URANIUM PRICE VOLATILITY

The Company's earnings are dependent on the price of uranium, which is determined primarily by global supply and demand and by the relationship of that price to the Company's costs of production. Historically, uranium prices have been subject to fluctuation, and the price of uranium has been and will continue to be affected by numerous factors beyond the Company's control, including the demand for nuclear power, political and economic conditions, and governmental legislation in uranium producing and consuming countries and production levels and costs of production of other producing companies. Certain of the Company's current long and medium-term contracts have pricing mechanisms related to spot market prices. In recent year's, prior to 1996, imports of uranium, including imports of uranium from the CIS, have resulted in significant downward pressure on uranium prices.

The spot market price for uranium has demonstrated a large range since January 1995. Prices have risen from $9.65 per pound as of January 31, 1995 to a high of $16.50 per pound as of May 31, 1996. The spot price as of February 28, 1998 was $10.75 per pound. The current spot prices of uranium are at levels which would allow for sales contracts that are priced above the Company's cash cost of uranium production, allowing the Company to achieve a positive cash flow of operations. The Company's cash flow from operations for the year ended December 31, 1997 was $4,931,000. There is no assurance that such price level will remain at this level.

URANIUM CONTRACTS PROFITABILITY

As of December 31, 1997, the Company had contracts for delivery of an estimated 3.9 million pounds of uranium (exclusive of 90,000 pounds of Russian uranium sales made pursuant to the matched sales program) to domestic utilities from January 1, 1998 through 2002. Profitability to the Company on these deliveries will depend on the cost of producing uranium at the Company's mining properties, the Company's ability to produce uranium to meet its sales commitments and the spot market price of uranium.

LIMITED MARKET; DEPENDENCE ON A FEW CUSTOMERS

The Company's primary source of revenue is derived from its sale of uranium to U.S. nuclear power plants. Uranium's only current commercial use is as fuel for nuclear power reactors. Accordingly, the Company's present and potential customers are electric utilities that operate nuclear power plants. The United States is the world's largest producer of nuclear-generated electricity. As of November 1997, there were 106 nuclear units in the United States. Currently, there are no new nuclear power plants under construction in the U.S. As of November 1997, there were 364 nuclear power plants in the Western World, with 32 power plants being constructed in parts of the world other than the U.S. There can be no assurance that the Company can continue to compete successfully for such customers.

A significant portion of the Company's contracted sales of uranium from January 1, 1998 through December 31, 2002 are represented by nine long-term contracts with eight different customers, three of which represented 18%, 15% and 13% of sales for the year ended December 31, 1997; five of which represent 20%, 16%, 15%, 12% and 11% of sales for the year ended December 31, 1996 and four of which represented 23%, 14%, 10% and 10% of sales for the year ended December 31, 1995. The loss of any of these customers or curtailment of purchases by such customers could have a material adverse effect on the Company's financial condition and results of operations.

COMPETITION FROM ALTERNATIVE ENERGY SOURCES AND PUBLIC ACCEPTANCE OF NUCLEAR ENERGY

Nuclear energy competes with other sources of energy, including oil and gas, coal and hydro-electricity. These alternative energy sources are to some extent interchangeable with nuclear energy, particularly over the longer term. Lower prices of oil, gas, coal and hydro-electricity for an extended period of time, as well as the possibility of developing in the future other low cost sources for energy, have made and could continue to make nuclear power a less attractive fuel source for the generation of electricity, thus resulting in lower demand for uranium. Furthermore, the growth of the uranium and nuclear power industry beyond or maintenance at its current will depend upon continued and increased acceptance of nuclear technology as a means of generating electricity. Because of unique political, technological and environmental factors that affect the nuclear industry, the industry is subject to public opinion risks which have and could continue to have an adverse impact on the demand for nuclear power and increase the regulation of the nuclear power industry.

POTENTIAL ADVERSE IMPACT OF LOSS OF KEY PERSONNEL

Certain of the Company's employees have significant experience in the uranium ISL mining industry. The number of individuals with ISL experience is small. The continued success of the Company is dependent upon the efforts of these key individuals, and the loss of any one or more of such persons' services could have a material adverse effect on the Company's business operations and prospects. The Company has not entered into employment contracts with or purchased key man life insurance for any of these individuals.

MINING RISKS AND INSURANCE

The business of uranium mining generally is subject to a number of risks and hazards, including environmental hazards, industrial accidents, flooding, interruptions due to weather conditions and other acts of nature. Such risks could result in damage to or destruction of the Company's wellfield infrastructure and production facilities, as well as to adjacent properties, personal injury, environmental damage and processing and production delays, causing the Company monetary losses and possible legal liability. While the Company maintains, and intends to continue to maintain, liability, property damage and other insurance consistent with industry practice, no assurance can be given that such insurance will continue to be available, be available at economically acceptable premiums or be adequate to cover any resulting liability.

GLOSSARY OF CERTAIN TERMS

claim	A claim is a tract of land, the right to mine of which is held under the federal General Mining Law of 1872 and applicable local laws.
concentrates	A product from a uranium mining and milling facility, which is commonly referred to as uranium concentrate or U3 O8.
conversion	A process whereby uranium concentrates are converted into forms suitable for use as fuel in commercial nuclear reactors.
cut-off grade	Cut-off grade is determined by the following formula parameters: estimates over the relevant period of mining costs, ore treatment costs, general and administrative costs, refining costs, royalty expenses, process and refining recovery rates and uranium prices.
gross acres	Total acres under which the Company has mineral rights and can mine for uranium.
Indian country	A term derived from jurisdictional determinations in criminal law enforcement proceedings under 18 U.S.C. Section 1151 and understood to encompass territory situated within Indian reservations, land owned by Indian allottees and land within a dependent Indian community.
lixiviant	When used in connection with uranium in situ leach mining, a solution that is pumped into a permeable uranium ore body to dissolve uranium in order that a uranium solution can be pumped from production wells.
net acres	Actual acres under lease which may differ from gross acres when fractional mineral interests are not leased.
ore	Naturally occurring material from which a mineral or minerals of economic value can be extracted at a reasonable profit.
over feeding	Operating enrichment plants in a manner that reduces plant operating costs but increases the amount of uranium required to produce a given quantity of enriched uranium.
probable reserves	Reserves for which quantity and

grade and/or quality are computed from information similar to that used for proven (measured) reserves, but the sites for inspection, sampling, and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.

proven reserves	Reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings or drill holes; grade and/or quality are computed from the results of detailed sampling and (b) the sites for inspection, sampling and measurement are spaced so closely and the geologic character is so well defined that size, shape, depth and mineral content of reserves are well-established.
reclamation	Reclamation involves the returning of the surface area of the mining and wellfield operating areas to a condition similar to pre-mining.
recoverable reserves	Reserves that are either proven or probable, are physically minable, and can be profitably recovered under conditions specified at the time of the appraisal, based on a positive feasibility study. The calculation of minable reserves is adjusted for potential mining recovery and dilution.
reserve	That part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination.
restoration	Restoration involves returning an aquifer to a condition consistent with its pre-mining use and removing evidences of surface disturbance. The restoration of the wellfield can be accomplished by flushing the ore zone with native ground water and/or using reverse osmosis to remove ions to provide clean water for reinjection to flush the ore zone.
resources	A resource is a concentration of naturally occurring minerals in such a form that economic extraction is currently or potentially feasible.
roll front	The configuration of sedimentary uranium ore bodies as they appear within the host sand. A term that depicts an elongate uranium ore mass that is "C" shaped.
spot price	The price at which uranium may be purchased for delivery within one year.
surety obligations	A bond, letter of credit, or financial guarantee posted by a party in favor of a beneficiary to ensure the performance of its or another party's obligations, e.g., reclamation bonds, workers'

compensation bond, or guarantees of debt instruments.

tailings . . . . Waste material from a mineral processing mill after the metals and minerals of a commercial nature have been extracted; or that portion of the ore which remains after the valuable minerals have been extracted.

Trade Tech . . . . A Denver-based publisher of information for the nuclear fuel industry; the successor to the information services business of Nuexco.

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uranium or uranium concentrates	U_3O_8, or triuranium octoxide.
U_3O_8	Triuranium octoxide equivalent contained in uranium concentrates, referred to as uranium concentrate.
waste	Barren rock in a mine, or mineralized material that is too low in grade to be mined and milled at a profit.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY AND RELATED STOCKHOLDER MATTERS.

MARKET INFORMATION

The Company's Common Stock trades on NASDAQ under the trading symbol URIX. The following table sets forth the high and low sales prices for the Common Stock as reported through NASDAQ for the periods indicated:

	Common Stock	
Fiscal Quarter Ending	High	Low
December 31, 1997	7-1/8	2-1/2
September 30, 1997	7	3-7/8
June 30, 1997	6-3/8	4-3/4
March 31, 1997	8	5
December 31, 1996	13-5/8	7-1/8
September 30, 1996	14-25/32	9-35/64
June 30, 1996	17-5/8	12-1/8
March 31, 1996	15-1/2	5-5/8

The high and low sales prices for the common stock for the period January 1, 1998 through March 24, 1998, was $4.375 and $2.125, respectively.

HOLDERS

As of March 24, 1998, the Company had 12,053,027 shares of Common Stock outstanding held of record by 114 persons.

DIVIDENDS

The Company did not declare or pay any cash or other dividends on its Common Stock during the years ending December 31, 1995, 1996 or 1997. The Company does not anticipate paying dividends for the foreseeable future.

ITEM 6. SELECTED FINANCIAL DATA

	Year Ended December 31,				
	1997	1996	1995	1994	1993
	(In thousands, except per share and per pound amounts)				
CONSOLIDATED STATEMENTS OF OPERATIONS DATA					
Uranium sales:					
Produced uranium	$ 14,738	$ 17,827	$ 7,195	$ 959	$ 1,341
Purchased uranium	15,003	6,437	14,634	16,375	11,881
Cost of uranium sales	(29,269)	(20,122)	(17,235)	(13,466)	(10,216)
Writedown of uranium properties	—	—	(163)	—	(1,945)
Earnings (loss) from operations Before corporate expenses	471	4,142	4,431	3,868	1,061
Corporate expenses	(2,937)	(3,055)	(3,496)	(2,177)	(1,903)
Earnings (loss) from operations	(2,466)	1,087	935	1,691	(842)
Interest and other, net	(868)	(328)	(324)	163	387
Loss on acceleration of uranium contract	—	—	—	(349)	—
Loss on termination of joint venture and transfer to stockholders	—	—	(1,781)	—	—
Earnings (loss) before income taxes	(1,598)	759	1,170	1,505	(455)
Federal income tax (benefit)	(273)	—	(234)	300	(107)
Net earnings (loss)	$ (1,325)	$ 759	$ (936)	$ 1,205	$ (348)
Earnings (loss) per common share:					
Basic	$ (0.11)	$ 0.09	$ (0.12)	$ 0.17	$ (0.05)
Diluted	$ (0.11)	$ 0.08	$ (0.12)	$ 0.17	$ (0.05)
Weighted average common stock And equivalents outstanding:					
Basic	11,760	8,789	8,098	6,929	6,640
Diluted	11,760	10,031	8,098	7,193	6,640
CONSOLIDATED OPERATING AND OTHER DATA					
Cash provided by operations	$ 4,931	$ 9,294	$ 5,301	$ 5,000	$ 6,283
Pounds of uranium produced	871	1,360	612	—	—
Pounds of uranium purchased	1,275	488	660	1,329	510
Pounds of uranium delivered	2,240	1,656	1,633	1,001	753
Capital expenditures	$ 14,901	$ 14,607	$ 3,583	$ 3,183	$ 3,101
Average sales price per pound(1)	$ 13.71	$ 16.35	$ 15.64	$ 16.03	$ 17.56
Average cost of produced pounds sold (2)	$ 15.61	$ 11.34	$ 10.28	$ 13.60	$ 12.96
Average cost of purchased pounds sold	$ 10.40	$ 10.21	$ 9.41	$ 10.60	$ 10.88
Cash cost per produced pound(3)	$ 12.17	$ 8.51	$ 7.11	N/A	N/A
Average cost per produced pound(2)	$ 15.05	$ 12.12	$ 10.09	N/A	N/A
Average cost per purchased pound	$ 10.40	$ 10.21	$ 9.52	$ 10.07	$ 11.24

(1) Excludes sales of the Russian component of deliveries made under the matched sales amendment. The economic benefit of such sales are treated as "pass-through" sales.

(2) Average cost per produced pound consists of all operating costs, depletion, depreciation and accrued restoration and reclamation costs.

(3) Cash cost per pound consists of all operating costs and wellfield development costs associated with producing wellfields.

	Year Ended December 31,				
	1997	1996	1995	1994	1993
	(In thousands)				
CONSOLIDATED BALANCE SHEET DATA					
Cash and cash equivalents	$ 2,325	$ 16,934	$ 4,716	$ 2,528	$ 2,530
Working capital (deficit)	5,999	15,269	4,718	(2,545)	(2,777)
Uranium properties (net)	61,383	42,444	37,208	37,230	34,420
Total assets	74,864	68,794	48,085	44,850	40,846
Total debt (1)	8,419	12,577	7,487	9,227	11,286
Total liabilities	22,959	23,497	18,214	16,632	20,563
Total shareholders' equity	51,905	45,297	29,872	28,218	20,283

(1) Includes current portion of long-term debt and notes payable.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

FORWARD LOOKING STATEMENTS

This Item 7 contains "forward-looking statements" which are made pursuant to the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements include, without limitation, statements relating to liquidity, financing of operations, continued volatility of uranium prices and estimate of future net cash flows attributable to proved undeveloped reserves and other such matters. The words "believes," "expects," "projects," "targets," or "estimates" and similar expressions identify forward-looking statements. The Company does not undertake to update, revise or correct any of the forward-looking information. Readers are cautioned that such forward-looking statements should be read in conjunction with the Company's disclosures under the heading: "Cautionary Statement for the Purposes of the 'Safe Harbor' Provisions of the Private Securities Litigation Reform Act of 1995" beginning on page 22.

CAPITAL RESOURCES AND LIQUIDITY

Operating Cash Flows

At December 31, 1997, the Company's cash and cash equivalents were $2,325,000 compared to $16,934,000 at year end 1996. Cash and cash equivalents in 1996 increased by $12,218,000 from 1995 year end levels. The Company's uranium operations generated positive cash flow of $4,931,000 for the year ended December 31, 1997, in comparison to positive cash flow from operations in 1996 and 1995 of $9,294,000 and $5,301,000, respectively. The Company's net working capital at December 31, 1997 and 1996 was $5,999,000 and $15,269,000, respectively.

In March 1998, the Company entered into an agreement to extend the maturity date of its $6,000,000 secured convertible note from May 31, 1998 to May 31, 2000. As a result of this two year extension, the Company reclassified this obligation as a long-term obligation and had a positive impact of $6,000,000 to its net working capital at December 31, 1997. The note is convertible into shares of the Company's common stock. In return for the extension in the maturity of the note, the conversion price was adjusted from $4.00 per share to $3.00. The exercise price of certain outstanding warrants held by the noteholder to purchase 1,000,000 shares of the Company's common stock was also adjusted from $4.00 per share to $3.00 per share, and the expiration date of the warrants was extended by two years, to May 31, 2000.

During January 1995, when companies controlled by Oren L. Benton (the "Benton Companies") held effective control of the common stock of the Company, the Company transferred $1 million to the Benton Companies in connection with a planned joint venture to process uranium at a Benton Companies' mill. Shortly thereafter, an additional $1,080,000 was transferred to or for the benefit of Mr. Benton or certain Benton Companies without the authorization of the Company's Board of Directors. In February 1995, Mr. Benton and certain of the Benton Companies filed for bankruptcy. The Company has recovered $875,000 related to the unauthorized transfer ($300,000 in 1995 and $575,000 in 1997); however, the remaining $1.2 million has not been recovered and there can be no assurance that the Company's efforts to pursue remedies will be successful. A loss for these transactions of $1.78 million was recorded in 1995 and the recovery of $575,000 in 1997 resulted in an increase to other income in the second quarter of this year.

Investing Cash Flows

The Company resumed development activities at its Rosita site during the second quarter of 1995 and uranium production began in June 1995. During 1996 and 1997, $2,002,000 and $2,450,000 in capital expenditures were incurred at Rosita, respectively. Capital expenditures to be incurred for 1998 at Rosita, primarily for satellite plant and additional wellfield development, are expected to be approximately $763,000. Significant development activities at the Company's Kingsville Dome facility began in December 1995 and resulted in commencement of production at this site in March 1996. Capital expenditures at Kingsville Dome during 1996 and 1997 totaled $6,695,000 and $8,998,000, respectively and are expected to be $4,280,000 in 1998. The Company expects to fund its 1998 operations and capital expenditures at its Kingsville Dome and Rosita projects from cash on hand, sales proceeds under uranium deliveries and through existing financing arrangements.

In June 1996, the Company acquired the rights to a significant uranium deposit in South Texas known as the Alta Mesa project. The Company spent $4,000,000 to acquire the uranium rights to the property which is estimated to contain approximately 6.2 million pounds of in-place proven and probable reserves. Capital expenditures related primarily to permitting activities and land holding costs have totaled approximately $400,000 and $515,000, respectively in 1996 and 1997. Capital expenditures for permitting, plant construction and wellfield development are expected to be $680,000 in 1998. Extensive drilling and environmental work has been undertaken on this property by previous leaseholders which will be useful to the Company for licensing and pre-production evaluation of the project. The Company is targeting the production to commence in late 1998 with an annual capacity of 1.0 million pounds per year. The projected recovery factors on the Alta Mesa property are estimated at 65% to 75% of their in-place reserves and initial estimated production costs, including acquisition costs, plant and wellfield capital costs, operating costs and projected reclamation costs are projected to be below $10.00 per pound.

The initial capital costs to acquire the rights to the Alta Mesa property were obtained through a one-year note from the Lindner Dividend Fund. This $4.0 million note was repaid in January 1997 from the proceeds from the Company's equity placement completed in December 1996.

Capital expenditures at the Company's Churchrock, Crownpoint and Vasquez projects for permitting and land holding costs totaled approximately $1,300,000 and $2,900,000 in 1996 and 1997, respectively and are expected to be $1,200,000 in 1998. Capital requirements for 1998 and beyond for these projects are expected to be met through future sales proceeds from current and additional uranium delivery contracts and through future sources of debt and/or equity financing.

Cash used for other investing activities for 1996 and 1997 totaled $2,070,000 and $524,000, respectively and was for the purchase of certificates of deposit to fund certain bonding requirements at the Company's producing and development properties. These certificates of deposit are pledged under these bonding requirements and therefore are not readily available to the Company. See Note 1 - "Restricted Cash" of the Notes to Consolidated Financial Statements.

Financing Cash Flows

During May 1996, the Company entered into a one-year $3.0 million revolving credit facility. This facility was renewed and expanded to a $5.0 million credit facility which concludes July, 1999. This agreement is secured by the Company's uranium inventory and/or by receivables from its uranium sales

contracts. Principal and interest payments under the loan are due monthly, with interest on the loan accruing at the prime rate plus 1%. Principal advances, net of repayments, under the facility amounted to $1,950,000 in 1997.

In June 1996, the Company received $4.0 million in proceeds from the one-year note entered into with the Lindner Dividend Fund, noted previously. The terms of the note provided for the payment of both the principal and accrued interest by June 1997 with interest on the note accruing at a rate of 6.5% per annum. The principal and accrued interest on this note was paid in January 1997.

In December 1996, the Company completed an equity placement in which 2,000,000 shares of the Company's common stock were sold in a public offering. Net proceeds to the Company totaled over $14,000,000 with $4,900,000 of the proceeds used in January 1997 to repay the $4.0 million note from the Lindner Dividend Fund and to pay certain other long-term obligations. The balance of the proceeds was used for working capital purposes and to fund development activities at the Company's projects. In 1996, the Company also generated approximately $630,000 from the issuance of approximately 167,000 shares of common stock upon the exercise of certain stock options and stock warrants.

Net cash generated from the Company's financing activities in 1995 totaled approximately $720,000. The Company received $2,000,000 in December 1995 from the exercise of 500,000 of the warrants issued in connection with the Lindner Notes and also received $460,000 during the year from the issuance of approximately 156,000 shares of common stock associated with the exercise of certain employee and directors stock options.

The Company received $6,000,000 under the convertible loan made in May 1995 by Lindner Investments and Lindner Dividend Fund and had debt payments during the year under a note to a bank totaling $7,740,000.

ENVIRONMENTAL ASPECTS

The Company utilizes ISL solution mining technology as its only mining method. Unlike conventional uranium mining companies, the Company's mining technology does not create "tailings". Nevertheless, the Company is highly regulated. Its primary environmental costs to date have been related to obtaining and complying with environmental mining permits and, once mining is completed, the reclamation and restoration of the surface areas and underground water quality to a condition consistent with applicable requirements. Accruals for the estimated future cost of such activities are made on a per-pound basis as part of production costs. See the Consolidated Statements of Operations for the applicable provisions for such future costs. See also Note 1 - "Restoration and Reclamation Costs" of Notes to Consolidated Financial Statements.

RESULTS OF OPERATIONS

Revenues, earnings from operations and net income for the Company can fluctuate significantly on a quarter to quarter basis during the year because of the timing of deliveries requested by its utility customers. The Company's customers have generally elected, where possible, to take delivery of the bulk of the annual deliveries under their long-term sales contracts later in each year. Accordingly, operating results for any quarter or year-to-date period are not necessarily comparable and may not be indicative of the results which may be expected for future quarters or for the entire year.

Years Ended December 31, 1997, 1996 and 1995

The following is a summary of the key operational and financial statistics related to the Results of Operations:

	1997	1996	1995
	(In thousands, except per pound data)		
Uranium sales revenue (1)	$ 29,741	$ 24,264	$ 21,829
Total pounds delivered	2,240	1,656	1,633
Average sales price/pound(2)	$ 13.71	$ 16.35	$ 15.64
Pounds produced	871	1,360	612
Pounds purchased	1,275	488	660
Average production cost of produced pounds	$ 15.85	$ 12.12	$ 10.09
Average cost of purchased pounds	$ 10.40	$ 10.21	$ 9.52
Average cost of produced pounds sold	$ 15.61	$ 11.34	$ 10.28
Average cost of purchased pounds sold	$ 10.40	$ 10.21	$ 9.41

(1) 1997, 1996 and 1995 uranium sales revenues include approximately $2.8 million, $4.5 million and $3.5 million, respectively, from the sale of Russian uranium which is sold under the matched sales Amendment.

(2) Average sales price does not include the sales of Russian material sold as a "pass through" sale under the matched sales Amendment.

Revenue from uranium sales in 1997 increased by $5,477,000 from 1996 amounts. This increase resulted primarily from higher uranium deliveries this year compared to 1996. Deliveries were comprised of produced pounds, purchased uranium sold into existing contracts and purchased uranium whose economic benefit is essentially treated as a "pass through" sale (this includes the delivery of Russian origin uranium under the Company's matched sales contracts). The quantity of the pass through sales increased from 390,000 pounds in 1996 to 685,000 pounds in 1997 and while such sales have a positive impact on revenues they have virtually no impact on earnings from operations or net income.

The deliveries of the Company's produced pounds and non-pass through purchased pounds in 1996 was approximately 1,266,000 pounds compared to 1,555,000 in 1997. The average sales price for such sales in 1996 was $16.35 per pound compared to $14.68 in 1997. The deliveries in 1996 included 250,000 pounds of spot sales made pursuant to matched sale agreements, the average price for these deliveries was $17.95 per pound. No spot sales under the matched sales agreements were made in 1997. The average sales price for total uranium deliveries (including Russian origin uranium) in 1997 and 1996 was $13.28 per pound and $14.65 per pound, respectively.

Revenue from uranium sales in 1995 was $21,829,000 on deliveries of 1,633,000 pounds. Sales made in 1995 under the matched sales agreements totaled 780,000 pounds during the year. The 780,000 pounds delivered in 1995 included 320,000 of URI produced uranium and 460,000 pounds of Russian purchased uranium. Sales under the Company's long-term contracts not subject to the Amendment totaled 715,000 pounds in 1995 at an average sales price of $17.50 per pound. The deliveries in 1995 also included 137,000 pounds sold in the spot market.

Details of the cost of uranium sales were as follows:

	1997	1996	1995
		(In thousands)	
Cost of purchased uranium	$13,258	$ 4,979	$10,315
Royalties	834	1,198	432
Operating expenses	6,564	4,866	2,738
Provision for restoration and reclamation costs	1,032	1,480	597
Depreciation and depletion of uranium properties	7,581	7,599	3,154
Writedown of uranium properties	--	--	163
Total cost of uranium sales	$29,269	$20,122	$17,399

The Company produced approximately 871,000 pounds from its two South Texas facilities in 1997. During the first half of 1997, the Company experienced certain severe production challenges resulting from operating inefficiencies and operating techniques in dealing with the subsurface geochemical conditions at Kingsville Dome and Rosita. As a result, the Company's 1997 production fell compared to the 1,360,000 pounds produced in 1996.

Starting in the second quarter of 1997, a number of organizational and operating changes, including plant design modifications, were implemented to address specific production inefficiencies. The main operating changes related to the water quality of the mine areas under wellfield at each site. Certain redesign of the plants and wellfield patterns were performed to mitigate the effects of continuously recycled ground water utilized in the production process by minimizing the amount of mine water that previously was used in multiple wellfields. By focusing on mining each wellfield with its own native groundwater, the efficiency of the mining process is increased. This change in methodology required a brief shut-down during the year at the Kingsville Dome plant to allow for a re-piping of the facility. This change in technique is expected to permit future mining from this and future sites to utilize less capital intensive remote ion exchange facilities to mine new wellfields at Kingsville Dome and Rosita and at the Alta Mesa and Vasquez projects once their production begins. The utilization of these modified techniques is projected to reduce capital requirements for new projects such as Alta Mesa and Vasquez by approximately $4.0 million at each project. The change to the remote ion exchange methods is also projected to lower operating costs for mining new wellfields located farther away from the main plant at each location. The results from these changes were first demonstrated in the operations results achieved in the fourth quarter of 1997. The fourth quarter saw increases in average monthly production from approximately 55,000 pounds in the third quarter to nearly 95,000 pounds per month in the fourth quarter. With this increase in production, the average per pound production cost fell from $16.65 in the third quarter to $14.55 in the fourth quarter.

Production from Rosita totaled 230,000 pounds in 1997 compared to 500,000 pounds in 1996. The Company will continue production at Rosita in its current mine areas, such areas are expected to contain the majority of the remaining uranium reserves at this site with projected production from this area continuing beyond 1999.

The Company expects that as production options in new wellfields at Rosita become limited, that the latter stages of production may result in production costs that are higher than previously experienced. New operating techniques to increase productivity from these wellfields will be reviewed and may be implemented to determine how various recovery options may impact future projects. There can be no assurance that such methods will enhance production or improve cost efficiencies.

Kingsville Dome production for 1997 of 640,000 pounds as compared to 860,000 pounds in 1996. The Company is continuing to develop and produce from this facility and in January 1998 received authorization to begin production at its next production area ("PAA #3"). Wellfield drilling and development in PAA #3 is underway and production is expected from these wellfields by mid-1998.

The average cost of uranium purchases made in 1997 was $10.40 per pound compared to $10.21 in 1996. Total deliveries in 1997 consisted of 1,275,400 purchased pounds, at an average cost per pound of $10.40, and 965,000 produced pounds at $15.61 per pound. During 1996, the Company delivered 487,500 purchased pounds at an average cost per pound of $10.21 and 1,168,000 pounds of produced uranium at an average cost of $11.34 per pound.

Operating expenses totaled $6,564,000 ($6.80 per pound) in 1997 compared to $4,866,000 ($4.92 per pound) for produced pounds that were sold in 1996. Total operating expenses and depreciation and depletion include standby costs for the Kingsville Dome and Rosita facilities when these facilities are not in production. These costs have been recorded as direct charges to operations. Standby costs for 1996 and 1995 were $313,000 and $875,000, respectively.

The provision for restoration and reclamation in 1997 consists of $910,000 ($0.95 per pound) for production sold in 1997 and $120,000 for costs associated with reclamation activities related to the Benavides project (a previous mining location). The provision for restoration and reclamation in 1996 consists of $1,100,000 ($0.94 per pound) for production sold during 1996 and $380,000 for costs associated with reclamation activities related to the Benavides project. The provision for restoration and reclamation in 1995 consists of $499,000 ($0.93 per pound) for Rosita production sold during 1995 and additional increases to the Benavides and Bruni reserves (previous mining locations) of $97,000.

The depreciation and depletion provision in 1997 consisted of $7,580,000 (an average rate of $7.86 per pound). The depreciation and depletion provision in 1996 consisted of $7,578,000 (an average rate of $6.49 per pound) for Rosita and Kingsville Dome production sold and Kingsville Dome depreciation while on standby of $21,000. The depreciation and depletion provision in 1995 consisted of $3,042,000 (an average rate of $5.67 per pound) for Rosita production sold and Rosita and Kingsville Dome depreciation while on standby of $112,000.

Royalties in 1997 totaled $834,000 compared to $1,198,000 in 1996 and $432,000 in 1995. The decrease in 1997 is directly attributable to the lower production from Rosita and Kingsville Dome and the corresponding reduction in sales of produced uranium compared to 1996. Similarly, the increase in 1996 over 1995 amounts resulted from the startup of Kingsville Dome production in 1996 and the increased sales of produced uranium compared to 1995 deliveries.

Corporate expenses consisting of general and administrative ("G&A") expenses decreased to $2,914,000 in 1997 from $3,055,000 in 1996. This decrease resulted primarily from legal and accounting fees and other expenses incurred in 1996 associated with the unsuccessful acquisition bid for a significant uranium production company and continuing legal costs associated with the unauthorized transfer of funds in 1995. Corporate expenses decreased to $3,055,000 in 1996 from $3,496,000 in 1995. This decrease resulted from a reduction of activities related to the Benton Companies transactions in 1996 and the costs associated with the issuance of the Lindner Notes incurred in 1995.

Interest and other income increased by $754,000 in 1997 compared to 1996. This increase resulted primarily from the settlement in June 1997 of the Company's lawsuit against the Professional Bank of Denver, Colorado ($575,000) and an increase in interest income for the current year. The higher interest income resulted from higher average available cash and investment balances that were generated from the Company's equity placement in December 1996. Interest and other income in 1996 increased to $282,000 from $201,000 in 1995 primarily resulting from uranium drying services provided during 1996.

Total interest costs for 1997, net of capitalized amounts decreased from 1996. This decrease resulted from the repayment in January 1997 of the additional $4.0 million borrowed in June 1996 to finance the purchase of the Alta Mesa property ($134,000 reduction in interest cost). Interest cost in 1997 increased as a result of the Company entering into a financial surety agreement with USF&G for the issuance of surety bonds related to the Company's reclamation and restoration commitments at its current and prior mine locations (increase of $85,000). Net interest cost in 1997 also decreased compared to 1996 because of higher capitalized interest during the current year (approximately $367,000). The increase in permitting and development activities in New Mexico and Texas properties required the additional capitalization of interest related to these projects. Total interest costs for 1996 including capitalized amounts increased from the prior year primarily because of the $4.0 million borrowings received in June 1996 and from advances received under the Company's credit facility with NationsBank which commenced May 1996.

The Company currently utilizes computer software in the management of its operations and in accounting for its operating results that could be affected by the date change in the year 2000. All critical software utilized by the Company has been purchased from and is supported by third party vendors. The Company has conducted a review of the potential impact of the year 2000, and believes that it will not encounter significant operational or financial costs related to compliance with this issue.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information called for by Item 8 appears on pages F-1 through F-23 of this Annual Report on Form 10-K.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

PART III

ITEMS 10, 11, 12 AND 13.

In accordance with General Instruction G(3), Items 10, 11, 12, and 13 are hereby incorporated by reference from sections of the Company's definitive proxy statement entitled "Election of Directors", "Executive Compensation", "Security Ownership of Principal Stockholders and Management", and "Certain Transactions with Related Parties". Such definitive proxy statement will be filed with the Securities and Exchange Commission not later than 120 days after December 31, 1997.

PART IV

ITEM 14. EXHIBITS, FINANCIAL STATEMENT SCHEDULES AND REPORTS ON FORM 8-K.

(a) (1) Financial Statements.

See the Index to Consolidated Financial Statements on page F-1 for a listing of those financial statements filed as part of this Annual Report.

(a) (2) Financial Statement Schedules.

See the Index to Consolidated Financial Statements on page F-1 for a listing of those financial statements filed as part of this Annual Report.

(a) (3) Exhibits.

See the Index to Exhibits on page E-1 for a listing of the exhibits that are filed as part of this Annual Report.

(b) Reports on Form 8-K

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Date: March 27, 1998

URANIUM RESOURCES, INC.

By: /s/ Paul K. Willmott

Paul K. Willmott, President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Date
/s/ Paul K. Willmott Paul K. Willmott, Director, President and Chief Executive Officer	March 27, 1998
/s/ Thomas H. Ehrlich Thomas H. Ehrlich, Vice President - Finance and Chief Financial Officer (Principal Financial and Accounting Officer)	March 27, 1998
/s/ Leland O. Erdahl Leland O. Erdahl, Director	March 27, 1998
/s/ George R. Ireland George R. Ireland, Director	March 27, 1998
/s/ James B. Tompkins James B. Tompkins, Director	March 27, 1998

URANIUM RESOURCES, INC. AND CONSOLIDATED SUBSIDIARIES
INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

CONSOLIDATED FINANCIAL STATEMENTS

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Notes to Consolidated Financial Statements F-8

The additional financial data referred to below should be read in conjunction with these financial statements. Schedules not included with this additional financial data have been omitted because they are not applicable, or the required information is shown in the financial statements or notes thereto. The individual financial statements of the subsidiaries of the Company have been omitted because all such subsidiaries are included in the consolidated financial statements being filed.

ADDITIONAL FINANCIAL DATA

Financial statement schedules for the years ended
December 31, 1997, 1996 and 1995

II - Valuation and qualifying accounts and reserves . . F-22

The accounts of the Company are maintained in United States dollars. All dollar amounts in the financial statements are stated in United States dollars except where indicated.

REPORT OF INDEPENDENT PUBLIC ACCOUNTANTS

To the Shareholders and Board of Directors of
Uranium Resources, Inc.:

We have audited the accompanying consolidated balance sheets of Uranium Resources, Inc. (a Delaware Corporation) and subsidiaries as of December 31, 1997 and 1996, and the related consolidated statements of operations, shareholders' equity, and cash flows for each of the three years in the period ended December 31, 1997. These consolidated financial statements and the schedule referred to below are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements and schedule based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Uranium Resources, Inc. and subsidiaries as of December 31, 1997 and 1996, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 1997, in conformity with generally accepted accounting principles.

Our audits were made for the purpose of forming an opinion on the basic financial statements taken as a whole. The schedule listed in the index of financial statements is presented for purposes of complying with the Securities and Exchange Commission's rules and is not part of the basic financial statements. The schedule has been subjected to the auditing procedures applied in the audits of the basic financial statements and, in our opinion, fairly state in all material respects the financial data required to be set forth therein in relation to the basic financial statements taken as a whole.

/s/ Arthur Andersen LLP

ARTHUR ANDERSEN LLP

Dallas, Texas

February 23, 1998 (except with respect to the matters discussed in Note 5 and Note 7 as to which the date is March 23, 1998)

URANIUM RESOURCES, INC.

CONSOLIDATED BALANCE SHEETS

ASSETS

	December 31, 1997	December 31, 1996
Current assets:		
Cash and cash equivalents	$ 2,325,158	$ 16,934,276
Short-term investment:		
Certificate of deposit, restricted	3,304,195	2,779,840
Receivables, net	4,507,090	1,829,539
Uranium inventory	2,260,200	3,575,285
Materials and supplies inventory	91,047	88,483
Prepaid and other current assets	253,910	239,435
Total current assets	12,741,600	25,446,858
Property, plant and equipment, at cost:		
Uranium properties	97,100,015	71,364,561
Other property, plant and equipment	580,676	546,985
Less-accumulated depreciation and depletion	(36,235,274)	(29,335,818)
Net property, plant and equipment	61,445,417	42,575,728
Other assets	676,952	771,084
	$ 74,863,969	$ 68,793,670

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.

CONSOLIDATED BALANCE SHEETS

LIABILITIES AND SHAREHOLDERS' EQUITY

	December 31, 1997	December 31, 1996
Current liabilities:		
Accounts payable	$ 3,233,277	$ 2,201,145
Notes payable	1,950,000	5,440,000
Accrued interest payable	5,035	185,186
Current portion of long-term debt	7,000	730,074
Royalties payable	630,284	746,113
Current portion of restoration reserve	511,000	368,000
Other accrued liabilities	405,814	507,117
Total current liabilities	6,742,410	10,177,635
Other long-term liabilities and deferred credits	4,787,427	4,279,289
Long-term debt, less current portion	6,462,343	6,407,054
Deferred federal income taxes	4,967,000	2,633,000
Shareholders' equity:		
Common stock, $.001 par value, shares authorized: 25,000,000 shares issued and outstanding (net of treasury shares): 1997 - 12,053,027; 1996 - 10,813,027	12,205	10,966
Paid-in capital	40,222,359	32,290,630
Retained earnings	11,679,643	13,004,514
Less: Treasury stock (152,500 shares), at cost	(9,418)	(9,418)
Total shareholders' equity	51,904,789	45,296,692
	$ 74,863,969	$ 68,793,670

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS

	Year Ended December 31, 1997	1996	1995
Revenues:			
Uranium sales -			
Produced uranium	$ 14,737,579	$ 17,827,204	$ 7,194,655
Purchased uranium	15,002,838	6,437,105	14,634,591
Uranium sales	29,740,417	24,264,309	21,829,246
Costs and expenses:			
Cost of uranium sales -			
Direct cost of purchased uranium	13,257,989	4,979,407	10,314,611
Royalties	833,534	1,197,890	432,050
Operating expenses	6,564,363	4,866,436	2,738,420
Provision for restoration and reclamation costs	1,032,587	1,479,939	596,482
Depreciation and depletion	7,580,809	7,599,047	3,153,793
Writedown of uranium properties and other uranium assets	--	--	163,145
Total cost of uranium sales	29,269,282	20,122,719	17,398,501
Earnings from operations before corporate expenses	471,135	4,141,590	4,430,745
Corporate expenses -			
General and administrative	2,913,776	3,033,819	3,467,639
Depreciation	22,956	20,875	28,235
Total corporate expenses	2,936,732	3,054,694	3,495,874
Earnings (loss) from operations	(2,465,597)	1,086,896	934,871
Other income (expense):			
Interest expense, net of capitalized interest	(160,789)	(610,403)	(525,369)
Interest and other income, net	1,036,290	282,370	201,263
Loss on termination of joint venture	--	--	(1,080,953)
Loss on transfer to stockholder	--	--	(700,000)
Earnings (loss) before federal income taxes	(1,590,096)	758,863	(1,170,188)
Federal income tax provision (benefit):			
Current	44,775	25,000	18,000
Deferred	(310,000)	(25,000)	(252,000)
Net earnings (loss)	$ (1,324,871)	$ 758,863	$ (936,188)
Net earnings (loss) per common share:			
Basic	$ (0.11)	$ 0.09	$ (0.12)
Diluted	$ (0.11)	$ 0.08	$ (0.12)

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.

CONSOLIDATED STATEMENTS OF COMMON SHAREHOLDERS' EQUITY

	Common Stock				
	Shares	Amount	Paid-In Capital	Retained Earnings	Treasury Stock
Balances, December 31, 1994	7,954,683	$ 8,142	$ 15,040,064	$ 13,181,839	$ (11,580)
Net loss	—	—	—	(936,188)	—
Common stock issuance for employee/director stock option plans	156,015	156	458,908	—	—
Common stock issuance for stock warrants	500,000	500	1,999,500	—	—
Treasury shares issued	35,000	—	128,038	—	2,162
Balances, December 31, 1995	8,645,698	$ 8,798	$ 17,626,510	$ 12,245,651	$ (9,418)
Net income	—	—	—	758,863	—
Common stock issuance	2,000,000	2,000	14,030,949	—	—
Common stock issuance for employee stock option plans	119,329	120	441,219	—	—
Common stock issuance for stock warrants	48,000	48	191,952	—	—
Balances, December 31, 1996	10,813,027	$ 10,966	$ 32,290,630	$ 13,004,514	$ (9,418)
Net loss	—	—	—	(1,324,871)	—
Common stock issuance	1,200,000	1,200	7,798,800	—	—
Common stock issuance for employee stock option plans	25,500	25	74,944	—	—
Common stock issuance for stock warrants	14,500	14	57,985	—	—
Balances, December 31, 1997	12,053,027	$ 12,205	$ 40,222,359	$ 11,679,643	$ (9,418)

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31, 1997	1996	1995
Cash flows from operations:			
Net earnings (loss)	$ (1,324,871)	$ 758,863	$ (936,188)
Reconciliation of net income to cash provided by operations-			
Provision for restoration and reclamation costs	1,032,587	1,479,939	596,482
Depreciation and depletion	7,603,765	7,619,922	3,182,028
Writedown of uranium properties and other assets	—	—	163,145
Provision (credit) for deferred income taxes	(318,000)	(25,000)	(252,000)
Decrease in restoration and reclamation accrual	(317,270)	(513,975)	(104,108)
Other non-cash items, net	205,169	274,243	401,711
Cash flow provided by operations, before changes in operating working capital items	6,881,388	9,593,992	3,051,070
Effect of changes in operating working capital items-			
(Increase) decrease in receivables	(2,677,551)	2,175,652	(3,952,451)
(Increase) decrease in inventories	496,100	(1,000,793)	3,761,066
Increase in prepaid and other current assets	(446,910)	(367,894)	(238,201)
Increase (decrease) in payables and accrued liabilities	677,795	(1,187,157)	2,679,313
Net cash provided by operations	4,930,814	9,293,800	5,300,797
Investing activities:			
Increase in investments	(524,355)	(2,067,746)	(149,083)
Additions to property, plant and equipment -			
Kingsville Dome	(8,998,305)	(6,695,472)	(560,772)
Rosita	(2,450,105)	(2,001,722)	(2,108,508)
Alta Mesa	(514,503)	(4,403,070)	—
Churchrock	(1,013,257)	(596,725)	(477,686)
Crownpoint	(1,152,783)	(709,590)	(291,394)
Other property	(771,571)	(200,457)	(144,833)
Increase in other assets	(25,487)	(156,593)	(99,218)
Net cash used in investing activities	(15,450,366)	(16,831,375)	(3,832,294)
Financing activities:			
Proceeds from borrowings	3,500,000	10,869,000	6,135,000
Payments and refinancings of principal	(7,722,535)	(5,779,379)	(7,874,225)
Issuance of common stock and warrants, net	132,969	14,666,288	2,459,064
Net cash provided by (used in) financing activities	(4,089,566)	19,755,909	719,839
Net increase (decrease) in cash and cash equivalents	(14,609,118)	12,218,334	2,188,342
Cash and cash equivalents, beginning of period	16,934,276	4,715,942	2,527,600
Cash and cash equivalents, end of period	$ 2,325,158	$ 16,934,276	$ 4,715,942

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 1997

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

PRINCIPLES OF CONSOLIDATION AND DESCRIPTION OF COMPANY

The consolidated financial statements have been prepared in accordance with generally accepted accounting principles and include the accounts of Uranium Resources, Inc. ("URI") and its wholly owned subsidiaries (collectively "the Company"). All significant intercompany transactions have been eliminated in consolidation.

URI was formed in 1977 and incorporated in Delaware in 1987. The Company is primarily engaged in the business of acquiring, exploring, developing and mining uranium properties, using the in situ leach ("ISL") or solution mining process. The primary customers of the Company are major utilities who utilize nuclear power to generate electricity. The Company continuously evaluates the creditworthiness of its customers. The Company has been, in the past, involved in a number of significant ISL uranium mining joint venture arrangements and has also provided consulting, plant design and construction expertise to other companies. At present the Company owns both producing and development properties in South Texas and development properties in New Mexico. The Company's Rosita and Kingsville Dome uranium production facilities in South Texas resumed operations in June 1995 and March 1996, respectively, and were both in operation at December 31, 1997.

INVENTORIES

Uranium inventory consists of uranium concentrates (U308) located at the Company's Rosita and Kingsville Dome sites and also at converters awaiting delivery to customers. All uranium inventories are valued at the lower of cost (first-in, first-out) or market. The cost of produced uranium includes all operating production costs, and provisions for depreciation, depletion and future restoration obligations. Materials and supplies inventory is valued at the lower of average cost or market.

BORROWED URANIUM

Uranium is occasionally borrowed from other parties to facilitate deliveries under sales contracts. Repayment of the loan is normally made from production or from purchased uranium. The liability for borrowed uranium is recorded at the latest spot market price (estimated replacement cost) and the cost is adjusted to the actual amount when the borrowed material is repaid.

PROPERTY, PLANT AND EQUIPMENT

Uranium Properties

Capitalization of Development Costs - All acquisition, exploration and development costs (including financing, salary and related overhead costs) incurred in connection with the various uranium properties are capitalized. Gains or losses are recognized upon the sale of individual property interests. All costs incurred in connection with unsuccessful acquisition and exploration efforts and abandoned properties are charged to expense when known. All properties with significant acquisition or incurred costs are evaluated for their realizability on a property-by- property basis. Any impairment of such costs is recognized by providing a valuation allowance (see Note 2 - "Uranium Properties - Writedown of Abandoned Property"). Total exploration and evaluation costs capitalized in 1997, 1996 and 1995 were $120,000, $116,000 and $4,000, respectively.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

Depreciation and Depletion - In general, depletion of uranium mineral interests and related development costs is computed on a property-by-property basis using the units-of-production method based on the proved and probable recoverable uranium reserves as estimated periodically by the Company's geologists and engineers. Depreciation and depletion is provided on the investment costs, net of salvage value, of the various uranium properties' production plants and related equipment using the estimated production life of the uranium reserves. Other ancillary plant equipment and vehicles are depreciated using a straight line method based upon the estimated useful lives of the assets.

Other Property

Other property consists of corporate office equipment, furniture and fixtures and transportation equipment. Depreciation on other property is computed based upon the estimated useful lives of the assets. Repairs and maintenance costs are expensed as incurred. Gain or loss on disposal of such assets is recorded as other income or expense as such assets are disposed.

Capitalization of Interest

The Company capitalizes interest cost with respect to properties undergoing exploration or development activities that are not subject to depreciation or depletion. The average interest rate on outstanding borrowings during the period is used in calculating the amount of interest to be capitalized. Interest capitalized in the twelve months ended December 31, 1997, 1996 and 1995 amounted to $378,000, $11,000 and $11,000, respectively. Total interest costs in these periods were $547,000, $621,000 and $536,000, respectively.

RESTORATION AND RECLAMATION COSTS

Various federal and state mining laws and regulations require the Company to reclaim the surface areas and restore underground water quality to the pre-existing mine area average quality. Accruals for the estimated future cost of restoration and reclamation are made on a per-pound basis as part of production costs, or when it is determined by an engineering study that an adjustment to the accrual is required.

REVENUE RECOGNITION FOR CERTAIN URANIUM SALES

The Company recognizes revenue from the sale of uranium under which substantially all of its obligations related to the delivery have been completed. Under certain uranium sales contracts which contain origin-specific delivery requirements, the revenue from the portion of a sale which requires the satisfaction of future obligations is recorded as unearned revenue until these commitments are satisfied. Commitments that are expected to be completed within one year are classified as current; all others are recorded as long-term deferred credits.

EARNINGS PER SHARE

Effective with the year ended December 31, 1997, the Company adopted Statement of Financial Accounting Standards No. 128 ("FAS 128"), "Earnings per Share", which sets standards for the calculation and presentations of earnings per share. FAS 128 supercedes APB Opinion No.15, Earnings per Share. Net earnings (loss) per common share - basic has been calculated based on the weighted average shares outstanding during the year and net earnings (loss) per common share - diluted has been calculated assuming the exercise or conversion of all dilutive securities on January 1 of each year presented or as of the date of issuance if later.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

The weighted average number of shares used to calculate basic earnings per share were 11,760,000, 8,789,000 and 8,098,000 in 1997, 1996 and 1995, respectively. The weighted average number of shares used to calculate diluted earnings per share were 11,760,000, 10,031,000 and 8,098,000 in 1997, 1996 and 1995, respectively. The potential common stock that was excluded from the calculation of diluted earnings per share were 2,413,977, 46,000 and 1,321,940 in 1997, 1996 and 1995, respectively.

UNAMORTIZED DEBT ISSUANCE COSTS

Debt discount and related expenses arising from the issuance of debt securities are amortized by the effective interest method.

CONSOLIDATED STATEMENTS OF CASH FLOWS

The Company considers all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents.

Additional disclosures of cash flow information follow:

	Twelve Months Ended December 31, 1997	1996	1995
Cash paid during the period for:			
Interest	$687,000	$501,000	$524,000

The change in inventories in the Consolidated Statements of Cash Flows during 1997, 1996 and 1995 excludes the changes in uranium inventories for non-cash capitalized restoration and depreciation and depletion provisions. Such increases (decreases) totaled $(816,000), $1,923,000 and $391,000, respectively.

Certain additional non-cash transactions occurred in 1997 and 1995, and such major transactions are summarized as follows:

In March 1997, 1,200,000 common shares were issued to Santa Fe Pacific Gold in exchange for certain uranium mineral interests and exploration rights covering approximately 523,000 acres in New Mexico.	$7,800,000
In May 1995, 35,000 treasury shares were issued to financial advisors in connection with the Lindner Note (Note 5).	$ 130,200

RESTRICTED CASH

At December 31, 1997, 1996 and 1995, the Company had pledged a certificate of deposit of $3,304,000, $2,780,000 and $713,000, respectively, in order to collateralize surety bonds required for future restoration and reclamation obligations related to the Company's South Texas production and development properties. These funds are not readily available to the Company and are not included in cash equivalents.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

USE OF ESTIMATES

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make certain estimates and assumptions. Such estimates and assumptions may affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

RISKS AND UNCERTAINTIES

Historically, the market for uranium has experienced significant price fluctuations. Prices are significantly impacted by global supply and demand which is affected by the demand for nuclear power, political and economic conditions, governmental legislation in uranium producing and consuming countries, and production levels and costs of production of other producing companies. Increases or decreases in prices received could have a significant impact on the Company's future results of operations.

2. URANIUM PROPERTIES

KINGSVILLE DOME PROPERTY

In 1981, the Company acquired an exploration property in South Texas, known as Kingsville Dome, from Exxon Corporation. After significant production in 1988-1990, the property was put on a standby basis because of low uranium spot prices and production ceased in September 1990.

Wellfield development activities began in December 1995 at Kingsville Dome which lead to the resumption of production at the property in March 1996. Total uranium production for the period March 1996 through December 31, 1996 was approximately 860,000 pounds at a cost of approximately $12.31 per pound. Production in 1997 totaled 640,000 pounds at an average cost of approximately $15.47 per pound.

Cost of uranium sales in 1996, and 1995 in the Consolidated Statements of Operations includes $293,000 and $512,000, respectively of costs incurred to maintain the facility while Kingsville Dome was on standby and not in production. At December 31, 1997 the property contained approximately 2.6 million pounds of estimated recoverable proved and probable reserves and the net carrying value of the property was approximately $19,098,000.

ROSITA PROPERTY

In late 1985, the Company acquired several lease holdings in a uranium prospect ("Rosita") in South Texas. Construction and development activities began in the first quarter of 1990 and were completed in September 1990 with production commencing immediately thereafter. The property was originally put on a standby basis and production ceased in March 1992.

Wellfield development activity began in early 1995 at Rosita which lead to the resumption of production at the property in June 1995. Total production for the year ended December 31, 1996 was approximately 500,000 pounds at a cost of approximately $11.80 per pound. Production in 1997 totaled 230,000 pounds at an average cost of approximately $16.92 per pound.

Cost of uranium sales at December 31, 1995 in the Consolidated

Statements of Operations includes $246,000 of Rosita standby costs. At December 31, 1997, the property contained approximately 900,000 pounds of estimated recoverable proved and probable uranium reserves and the net carrying value of the property at December 31, 1997 was approximately $7,443,000.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

ALTA MESA PROPERTY

In June 1996, the Company acquired the Alta Mesa property consisting of 4,575 acres of leases in South Texas for a cash payment of $4 million of which $1 million is recoverable against one-half of future royalties. The lease term ends in December 1999 unless production from the property commences by that date (subject to extension for permitting delays).

As of December 31, 1997 the Alta Mesa property contained approximately 4,036,000 pounds of estimated recoverable proved and probable reserves. The Company filed license applications in the fourth quarter of 1996 and anticipates having the final permits in place in 1998. The net carrying value of this property at December 31, 1997 was approximately $4,918,000.

CHURCHROCK PROPERTIES

In December 1986, the Company acquired properties in the Churchrock region of New Mexico containing approximately 6,951,000 pounds of estimated recoverable proved and probable uranium reserves.

In September 1991, an additional 200 acres of leases were obtained in exchange for a future production royalty payment which, based upon the expected selling price of the uranium production, may vary between 5% and 10%. Preliminary analysis of the drilling data of these 200 acres indicates approximately 5,488,000 pounds of estimated recoverable proved and probable reserves.

Permitting activities are currently ongoing on both of these properties. The net carrying value of these properties at December 31, 1997 was approximately $7,914,000.

CROWNPOINT PROPERTY

In August 1988, the Company acquired the Crownpoint property, consisting of 163 acres of leases and related equipment and buildings for cash payments of $550,000, amounts payable in future years of $950,000 and a sliding scale overriding royalty on future production. The present value of the future payable amount, $407,054 at December 31, 1997, is recorded as a purchase money obligation. Additionally, also in 1988, the Company staked 321 acres of claims in the same area. In August 1993, the Company acquired approximately 959 acres of leases adjoining the Crownpoint properties. Initial interpretation of the drilling data for all the properties acquired in 1988 and 1993 indicate total estimated recoverable proved and probable uranium reserves of approximately 25,323,000 pounds. The net carrying value of these properties at December 31, 1997 was approximately $8,317,000.

SANTA FE PROPERTIES

In March 1997 the Company acquired from Santa Fe certain uranium mineral interests and exploration rights for uranium in New Mexico. The major components of the transaction include the following detail.

The Properties. The properties consist of: (a) 37,000 acres as to which the Company has acquired a fee interest in the entire mineral estate, excluding coal ("Category I Properties"); (b) approximately 140,000 acres as to which the Company has acquired the fee interest in uranium (the "Category II Properties"); and (c) approximately 346,000 acres as to which the Company has acquired the exclusive right to explore for uranium (the "Category III

Properties").

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

The Company is obligated to spend on exploration $200,000 per year for the ten year period starting in March 1997 and $400,000 per year for the seven year period starting in March 2007. This expenditure can be made on any of the Category II or Category III properties. The net carrying value of the property at December 31, 1997 was approximately $11,038,000.

WRITEDOWN OF ABANDONED PROPERTY

In the fourth quarter of 1995, the Company determined that certain evaluation projects in South Texas would not be pursued toward acquisition. The costs related to these projects were expensed in 1995 resulting in a pre-tax charge of approximately $163,000.

PROPERTY REALIZABILITY

The Company's ability to recover its investment in its uranium properties is dependent upon a number of factors, including, the sales price of uranium, the Company's ability to deliver profitable uranium production to its existing and future sales contracts and the Company's ability to access the financing/capital that may be necessary to develop and produce future projects. As discussed in Note 1, the market price of uranium has been volatile in recent years and there can be no assurance that the Company can continue to enter into new sales contracts at prices that are above the Company's existing or future production costs or that it will be able to recover its investment in its uranium properties.

3. CONTRACT COMMITMENTS

SALES CONTRACTS

The Company has entered into several long-term contract commitments to sell uranium. Included in URI's long-term contracts are sales to be made under the Amendment to the Russian Suspension Agreements (the "Amendment"). Such sales involve the sale of Russian origin uranium providing it is matched with U.S. uranium mined after March 11, 1994. Under these arrangements, the Russian uranium is essentially sold at its approximate purchase price. As a result, these "pass-through" sales of specifically Russian origin uranium are not expected to have a significant impact on the future profitability of the Company's operations but they are an important aspect of the Company's ability to sell its uranium at prices that exceed market. Total future sales of uranium concentrates (excluding the Russian component of sales made under the Amendment) of approximately 3,882,000 pounds represent future revenues of approximately $54,542,000 over the various contract periods from January 1, 1998 through 2002. The average current price of such future contracted deliveries, with escalation calculated through December 31, 1997, is $14.05. The Company has contracts which include various pricing provisions including contracts with market related prices and price ceilings and price floors which escalate for between 80%-100% of future inflation, contracts with fixed prices which escalate for between 80%-100% of future inflation and another contract whose pricing is based upon 99% of market prices without a price ceiling or floor.

All revenues for the twelve months ended December 31, 1997 were from sales to nine customers, four of which represented more than 10% of total revenues. Sales to these four customers totaled $5,500,000, $4,650,000, $4,445,000 and $3,851,000 in 1997.

All revenues for the twelve months ended December 31, 1996 were from sales to nine customers, five of which represented more than 10% of total revenues. Sales to these five customers totaled \$4,860,000, \$3,861,000, \$3,565,000, \$2,790,000 and \$2,663,000 during 1996. All revenues for the twelve months ended December 31, 1995 were from sales to ten customers, three of which represented more than 10% of total revenues. Sales to these three customers totaled \$5,040,000, \$3,011,000 and \$2,600,000 during 1995.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

PURCHASE CONTRACT COMMITMENTS

In 1990, the Company entered into a long-term purchase contract to purchase 250,000 pounds per year from 1992 through 1995, at an original base price of $10.50 per pound as of January 1, 1990, escalated at the rate of 50% of the prime rate and 50% of inflation. In 1995, the Company took deliveries of 200,000 pounds under this contract. On November 29, 1995, the Company and the supplier both agreed to terminate the contract and forego the delivery of the remaining 50,000 pounds. In July 1992, the Company entered into a long-term purchase contract to purchase 200,000 pounds annually from 1993 through 1995. The contract contained spot market pricing considerations and carried a minimum price of $8.00 per pound escalated at a 6% rate and a maximum price of $8.00 per pound escalated at an 18% rate. Deliveries under this contract were completed in 1995.

On August 28, 1995, the Company entered into two long-term Russian origin uranium purchase contracts to purchase between 40,000 and 60,000 pounds annually from 1995 through 1998 and to purchase a total of 480,000 pounds to be purchased from 1995 to 1998, respectively. The original base price of these two purchase commitments is significantly below current market prices for similar transactions. These contracts are subject to future price escalations based upon inflation indices. As of December 31, 1997, 90,000 pounds remain to be purchased with deliveries in 1998.

4. SHORT-TERM DEBT

NATIONSBANK CREDIT AGREEMENT

In May 1996 the Company entered into a $3.0 million revolving-credit facility with NationsBank, N.A. ("Nations"). In July, 1997 the facility was renewed and expanded to $5.0 million and for a two-year term. This facility is secured by the Company's uranium inventory and/or its receivables from its uranium sales contracts with interest on the loan accruing at the prime rate plus 1%. Principal and interest payments under the facility are due monthly. As of December 31, 1997, $1,950,000 was outstanding under this facility.

LINDNER SHORT-TERM NOTE

In June 1996 the Company entered into an agreement with Lindner Dividend Fund for a $4.0 million note to acquire the Alta Mesa property. The terms of the note provide for the payment of both the principal and accrued interest by June 1997. Interest on the note accrued at a rate of 6.5% per annum. The entire principal amount plus accrued interest was repaid in January 1997.

5. LONG-TERM DEBT

CITIBANK DEBT RESTRUCTURING AND EQUITY CONVERSION

On August 19, 1994 Nuexco Exchange, A.G., ("NEAG"), a company then owned by Mr. Benton, acquired a note (the "Note") outstanding to Citibank, N.A. ("Citibank") for $6,500,000. To fund this acquisition of the Note and for an additional loan to the Company, NEAG borrowed $12,500,000 from Union Bank of Switzerland ("UBS") and made a new loan to the Company of $6,000,000. The $6,000,000 loaned to the Company was used to purchase 648,648 pounds of uranium at $9.25 per pound from EFN. The notes due NEAG ("NEAG Notes") were secured by

599,423 pounds of uranium purchased from EFN and by the contracts between the Company and certain utilities for delivery of uranium. NEAG assigned their notes due from the Company and the related security to UBS. NEAG and UBS released all other collateral that had secured the original Citibank Note. The balance of the notes was paid in full by October 1995.

LINDNER NOTE

On May 25, 1995 the Company entered into an agreement with Lindner Investments and Lindner Dividend Fund, (the "Lender") two mutual funds managed by Ryback & Associates, for a $6 million secured convertible note with the Company (the "Lindner Note"). The Lindner Note was initially issued for a term of three years and bore interest at an annual rate of 6.5% and was convertible at any time during the three-year term into 1.5 million shares of the Company's common stock at an initial conversion price of $4.00 per share. The Lender also received a three-year warrant to purchase 1.5 million shares of the Company's common stock at an initial price of $4.00 per share. In 1995, the Lender exercised 500,000 shares of warrants under the agreement for an infusion of $2.0 million to the Company. Certain other financial advisors associated with the transaction were granted warrants and options to purchase up to 150,000 shares at an initial exercise price of $4.00 per share. As of December 31, 1997, these certain other financial advisors have exercised 62,500 shares of warrants under the agreement.

In March 1998, the Company entered into an agreement with the Lender to extend the maturity date of the Lindner Note to May 31, 2000. The note is convertible at any time during this term into 2.0 million shares of the Company's common stock at a conversion price of $3.00 per share. The exercise price and expiration date of the warrant was also adjusted. The remaining 1,000,000 shares under the warrant can be purchased by the Lender at $3.00 per share at any time during the term of the agreement which was extended to May 31, 2000.

The Lindner Note is secured by a mortgage on the Company's Rosita and Kingsville Dome uranium properties in Texas. Part of the proceeds from the Lindner Note were used to pay down existing payables and provide funding to complete the production start-up of the Company's Rosita property. The balance of the proceeds were used to fund pre- production activities at the Company's Kingsville Dome facility to permit commencement of production in 1996.

PURCHASE MONEY OBLIGATION

In 1987, the Company acquired certain long-term sales contract delivery rights in exchange for cash plus an assignment of a $3,000,000 future production payment, at $1.00 per pound of production sold from the Kingsville Dome and Rosita projects, starting in 1988. The production payment was recorded as a purchase money obligation at an original calculated present value of $2,379,839. The balance of the production payment was repaid in January 1997 ($730,074).

SUMMARY OF LONG-TERM DEBT

	At December 31,	
	1997	1996
Long-term debt of the Company consists of:		
Lindner Note	$ 6,000,000	$ 6,000,000

Purchase money obligation - Sales contract acquisitions	--	730,074
Crownpoint property (Note 2)	407,054	407,054
Other	62,289	--
	6,469,343	7,137,128
Less - Current portion	(7,000)	730,074
Total long-term debt	$ 6,462,343	$ 6,407,054

Maturities of long-term debt are as follows:

For the Twelve Months Ended:		For the Twelve Months Ended:	
December 31, 1998	7,000	December 31, 2001	$ 450,000
December 31, 1999	7,000	December 31, 2002 and beyond	--
December 31, 2000	6,805,000		

6. RELATED-PARTY TRANSACTIONS

During January 1995, a control group of companies based in Denver, Colorado (the "Benton Companies") held effective control of the common stock of the Company, the Company transferred $1.0 million to the Benton Companies in connection with a planned joint venture to process uranium at a Benton Companies' mill. The specific Benton Companies which were to be part of the planned joint venture did not receive the transferred funds. In February 1995, the Benton Companies filed for bankruptcy (the "Benton Bankruptcy"). Because of the bankruptcy, the realizability of the Company's $1.0 million investment is doubtful. Shortly thereafter, the then Chairman and CFO of the Company, who were also officers of the Benton Companies, transferred $1.08 million out of the Company without the authorization of the Company's Board of Directors. The Company recovered $300,000 in June 1995 and $575,000 in mid-1997 from the $1.08 million transfer, but $1.2 million of the initial $2.08 has not been recovered and there can be no assurance that the Company's efforts to pursue remedies will be successful. The Company recorded losses totaling $1.78 million for these transactions in 1995. The $575,000 recovered in 1997 was recorded to other income in the second quarter of this year.

In connection with the Benton Bankruptcy, the bankrupt estates have commenced an action against the Company in the United Stated Bankruptcy Court for the District of Colorado. The action seeks to recover approximately $1,600,000 from various transactions entered into with the Benton Companies. The Company intends to vigorously defend this action. The Company is unable to assess what adverse consequences, if any, might result from such action. The Company has asserted claims against Benton and the Benton Companies in the bankruptcy proceedings.

7. SHAREHOLDERS' EQUITY

COMMON STOCK

Common Stock Issued in 1997

In March 1997, the Company issued 1,200,000 shares of common stock to Santa Fe Pacific Gold Corporation in exchange for certain uranium mineral interests in New Mexico. The value of the common stock for the transaction was $6.50 per share and resulted in an increase to shareholders equity of $7.8 million.

Common Stock Issued in 1996

In December 1996, the Company completed a public sale of 2,000,000 shares of the Company's common stock at a price of $7.875 per share. The offering raised $15,750,000 before commissions and expenses of approximately $1,700,000.

Issuance of Treasury Shares

On May 25, 1995, the Company issued 35,000 shares of the Company's common stock which were held as treasury shares to financial advisors in connection with the Lindner Note as discussed in Note 5.

WARRANTS

Lindner Warrants

In connection with the May 1995 Lindner Note as discussed in Note 5, the Company issued a three-year warrant to purchase 1,500,000 shares of the Company's common stock at an initial conversion price of $4.00 per share. The warrants were initially exercisable at any time through May 1998. In 1995, 500,000 warrants were exercised. In addition, the Lindner Note was convertible at any time during the three year term into 1,500,000 shares of the Company's common stock at an initial conversion price of $4.00 per share, none of which have been converted at December 31, 1997. In March 1998, the Company extended the maturity date of the Lindner Note and revised the terms of the warrants and the convertible securities. See Note 5 - Long-Term Debt "Lindner Note" for further discussion.

Financial Advisors' Warrants/Options

On May 25, 1995, the Company issued a three-year warrant to purchase 100,000 shares of the Company's common stock at an initial conversion price of $4.00 per share to certain financial advisors associated with the Lindner Note transaction. The warrants are convertible at any time through May 1998. In addition, the Company granted options to purchase 50,000 shares at an initial conversion price of $4.00 per share. The options are immediately exercisable and expire on March 6, 2000. As of December 31, 1997, 62,500 warrants have been exercised.

STOCK OPTIONS

Directors Stock Options

On May 25, 1995, the Company granted options to certain directors of URI, to purchase 200,000 shares of the Company's common stock at an exercise price of $4.50 per share. All such options are immediately exercisable and were originally scheduled to expire May 24, 1998 or 30 days after the holder ceases to be a director of the Company or one year after such holder's death, whichever occurs first. In November 1997, the term of these options was revised for three years and the exercise price was increased to $4.75 per share. None of these options have been exercised as of December 31, 1997.

On August 16, 1995, the Company granted options to a director of URI, to purchase 100,000 shares of the Company's common stock at an exercise price of $8.38 per share which was the fair market value of a share of common stock on August 16, 1995. Such options are immediately exercisable and were originally scheduled to expire May 24, 1998, 30 days after the holder ceases to be a director of the Company or one year after his death, whichever occurs first. In November 1997, the term of these options was revised for three years and the exercise price was increased to $8.63 per share. None of these options have been exercised as of December 31, 1997.

Other Stock Options

On July 31, 1995, the Company granted options to a former officer of the Company to purchase 50,000 shares of the Company's common stock at an exercise price of $4.75 per share which was the fair market value of a share of common stock on that date. All of these options were exercised in 1996.

8. STOCK-BASED COMPENSATION PLANS

The Company has three stock option plans, the Employees' Stock Option Plan, the Stock Incentive Plan and the Directors' Stock Option Plan. The Company accounts for these plans under APB Opinion No. 25, under which no compensation cost has been recognized. Had compensation cost for these plans been determined consistent with FASB Statement No. 123 ("FAS 123"), the Company's net earnings (loss) and earnings (loss) per share ("EPS") for the year ended December 31, 1997, 1996 and 1995 would have been reduced to the following pro forma amounts:

		1997	1996	1995
Net Earnings (Loss):	As reported	$(1,324,871)	$ 758,863	$ (936,188)
	Pro forma	$(2,983,028)	$ (519,164)	$ 1,414,842)
Basic EPS:	As reported	$ (0.11)	$ 0.08	$ (0.12)
	Pro forma	$ (0.25)	$ (0.06)	$ (0.16)
Diluted EPS:	As reported	$ (0.11)	$ 0.08	$ (0.12)
	Pro forma	$ (0.25)	$ (0.06)	$ (0.16)

The fair value of each option is estimated on the date of grant using the Black-Sholes option-pricing model with the following weighted average assumptions used for grants in 1997, 1996 and 1995, respectively: expected volatility of 70%, 65% and 71% and risk-free interest rates of 6.4%, 6.0% and 6.1%. An expected life of 5.0, 4.6 and 5.0 years was used for options granted to the employees and directors, respectively.

The FAS 123 method of accounting has not been applied to options granted prior to January 1, 1995, and accordingly the resulting pro forma compensation cost may not be representative of that to be expected in future years.

The Directors' Stock Option Plan provides for the grant of 20,000 stock options to each of the non-employee directors along with additional annual grants of stock options upon re-election as directors at the Company's annual meeting. Currently there are 84,000 stock options outstanding under the Directors' Stock Option Plan. Also, on January 15, 1992, the Board of Directors approved the grant of 577,248 stock options under the Employees' Stock Option Plan. All of the previously outstanding options were canceled upon the effectiveness of the new options. On August 10, 1994, the Board of Directors increased the available options under the Employees' Stock Option Plan and the Directors' Stock Option Plan to 850,000 options and 150,000 options, respectively. On October 11, 1995, the Board of Directors elected to discontinue grants under the Employees' Stock Option Plan with the adoption of a stock incentive plan covering key employees. The Stock Incentive Plan provides for the grant of a maximum of 750,000 stock options. These options may be qualified or nonqualified. As of December 31, 1996, there are 338,810 options outstanding under the Stock Incentive Plan. Additional details about the options granted under the stock option plans are as follows:

			At December 31, 1997			
Date of Grant	Exercise Price	Options Granted	Options Available for Exercise	Options Exercised	Options Canceled	Options Outstanding
January 15, 1992	$2.94	617,248	104,623	327,625	185,000	104,623
May 22, 1992	$3.00	2,000	—	1,000	1,000	—
Balances at December 31, 1992		619,248	104,623	328,625	186,000	104,623
February 26, 1993	$2.50	10,000	—	2,500	7,500	—
May 27, 1993	$3.50	2,000	—	500	1,500	—
Balances at December 31, 1993		631,248	104,623	331,625	195,000	104,623
July 11, 1994	$4.38	20,000	15,000	—	—	20,000
August 10, 1994	$4.25	140,000	14,000	1,000	120,000	19,000
December 15, 1994	$5.88	3,000	1,500	—	1,000	2,000
Balances at December 31, 1994		794,248	135,123	332,625	316,000	145,623
February 24, 1995	$4.13	210,000	50,000	—	110,000	100,000
April 12, 1995	$3.88	10,000	5,000	—	—	10,000
May 26, 1995	$3.75	40,000	20,000	—	—	40,000
August 16, 1995	$8.38	100,000	50,000	—	—	100,000
August 31, 1995	$6.88	127,508	53,792	—	19,924	107,584
October 11, 1995	$6.94	35,000	17,500	—	—	35,000
December 19, 1995	$5.50	3,000	1,500	—	—	3,000
Balances at December 31, 1995		1,319,756	332,915	332,625	445,924	541,207
February 22, 1996	$9.75	178,810	40,238	—	17,880	160,930
May 29, 1996	$17.00	3,000	750	—	—	3,000
May 30, 1996	$16.13	75,000	18,750	—	—	75,000
July 22, 1996	$11.13	50,000	12,500	—	—	50,000
Balances at December 31, 1996		1,626,566	405,153	332,625	463,804	830,137
February 10, 1997	$7.125	182,405	—	—	10,700	171,705
April 1, 1997	$5.50	55,000	—	—	—	55,000
May 1, 1997	$5.00	3,000	—	—	—	3,000
Balances at December 31, 1997		1,866,971	405,153	332,625	474,504	1,059,842

The exercise price for the options granted under the stock option plans has been the approximate market price of the common stock on the date granted. The terms of the options provide that no options may be exercised for one year after grant, and then for ratable exercise over the subsequent four-year period, with a total exercisable period of ten years.

The exercise price for the options granted under the Stock Incentive Plan has been the approximate market price of the common stock on the date granted. The terms of the options are determined by the Board of Directors upon grant; however, no options may be exercised after a period of ten years.

URANIUM RESOURCES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (CONTINUED)
DECEMBER 31, 1997

9. FEDERAL INCOME TAXES

The deferred federal income tax liability consists of the following:

	December 31, 1997	December 31, 1996
Property development costs - net of amortization	$ 6,775,000	$ 6,745,000
Property acquisition costs	$ 2,652,000	—
Accelerated depreciation	210,000	180,000
Restoration reserves	(1,605,000)	(1,362,000)
Net operating loss and percentage depletion carryforwards	(5,396,000)	(5,296,000)
Valuation allowance and other - net	2,331,000	2,366,000
Total deferred income tax liability	$ 4,967,000	$ 2,633,000

Major items causing the Company's tax provision to differ from the federal statutory rate of 34% were:

	1997 Amount	1997 % of Pretax Income	1996 Amount	1996 % of Pretax Income	1995 Amount	1995 % of Pretax Income
Pretax income (loss)	$(1,598,096)		$ 758,863		$(1,170,188)	
Pretax income (loss) times statutory tax rate	(543,000)	34.0%	258,000	34.0%	(398,000)	(34.0%)
Increases (reductions) in taxes resulting from:						
Percentage depletion	543,000	(34.0%)	(258,000)	(34.0%)	398,000	34.0%
Alternative minimum Tax	(273,225)	0.0%	—	0.0%	(234,000)	(20.0%)
Income tax expense (benefit)	$ (273,225)	(17.1%)	$ —	0.0%	$ (234,000)	(20.0%)

The Company's net operating loss carryforwards generated in 1997 and in prior years have generally been valued, net of valuation allowance, at Alternative Minimum Tax ("AMT") rates imposed by the 1986 Tax Reform Act ("the 86 ACT"). It is expected that these deferred tax assets will be realized at such rates.

At December 31, 1997, approximately $8,300,000 of percentage depletion (available for regular tax purposes) had not been utilized to shelter book income and is available to carry forward to future accounting periods. The Company paid $45,000 in federal income taxes in 1997. No tax payments were required in 1996 or 1995.

The Company also has available for regular federal income tax purposes at December 31, 1997 estimated net operating loss carryforwards of approximately $10,400,000 which expire primarily in 1999 through 2011, if not previously utilized. At December 31, 1997, the Company had investment tax credit carryforwards of approximately $14,000, after adjusting for the reductions required by the 86 ACT, which expire for regular tax purposes in 1998 through 2000.

10. OTHER LONG-TERM LIABILITIES AND DEFERRED CREDITS

Other long-term liabilities and deferred credits on the balance sheet consisted of:

	December 31,	
	1997	1996
Reserve for future restoration and reclamation costs, net of current portion of $511,000 and $368,000 in 1997 and 1996 (Note 1)	$ 4,251,108	$ 3,768,495
Unearned revenue from Russian matched sales (Note 1)	536,318	510,794
	$ 4,787,427	$ 4,279,289

11. COMMITMENTS AND CONTINGENCIES

The Company's mining operations are subject to federal and state regulations for the protection of the environment, including water quality. These laws are constantly changing and generally becoming more restrictive. The ongoing costs of complying with such regulations has not been significant to the Company's annual operating costs. Future mine closure and reclamation costs are provided for as each pound of uranium is produced on a unit-of-production basis. The Company reviews its reclamation obligations each year and determines the appropriate unit charge. The Company also evaluates the status of current environmental laws and their potential impact on their accrual for costs. The Company believes its operations are in compliance with current environmental regulations.

The Company is from time to time involved in various legal proceedings of a character normally incident to its business. Management does not believe that adverse decisions in any pending or threatened proceedings will have a material adverse effect on the Company's financial condition or results of operations.

12. DISCLOSURES ABOUT THE FAIR VALUE OF FINANCIAL INSTRUMENTS

Statement of Financial Accounting Standards No. 107, "Disclosures About Fair Value of Financial Instruments," requires disclosure about the fair value of financial instruments. Carrying amounts for all financial instruments approximate fair value as of December 31, 1997. The fair value of debt is estimated based on the discounted value of the future cash flows using borrowing rates currently available to the Company for loans with similar terms and average maturities.

SCHEDULE II

URANIUM RESOURCES, INC.

VALUATION AND QUALIFYING ACCOUNTS AND RESERVES
FOR THE YEARS ENDED DECEMBER 31, 1997, 1996 AND 1995

Description	Balance at Beginning of Period	Additions: Charged to Costs and Expenses	Additions: Charged to Other Accounts	Deductions (a)	Balance at End of Period
Year ended December 31, 1997:					
Accrued restoration costs ...	$4,136,495	$1,032,587	$ 89,703(b)	$ 317,271	$4,762,108(d)
Year ended December 31, 1996:					
Accrued restoration costs ...	$2,990,151	$1,479,939	$ 100,380(b)	$ 513,975	$4,136,495(d)
Year ended December 31, 1995:					
Accrued restoration costs ...	$2,427,624	$ 596,482	$ 70,153(b)	$ 104,108	$2,990,151(d)

(a) Deductions represent costs incurred in the restoration process.

(b) Increase (decrease) resulted primarily from the change in the amounts of restoration provision included in ending uranium inventory.

(c) Decrease resulted primarily from restoration provision amounts in beginning inventory which were expensed in the current year.

(d) Amounts recorded as current liabilities at December 31, 1997, 1996 and 1995 are $511,000, $368,000 and $544,000, respectively.

EXHIBIT INDEX

Exhibit Number	Description	Sequentially Numbered Page
3.1*	Restated Certificate of Incorporation of the Company, as amended (filed with the Company's Annual Report on Form 10-K dated March 27, 1997).	
3.2*	Restated Bylaws of the Company (filed with the Company's Form S-3 Registration No. 333-17875 on December 16, 1996).	
4.1*	Registration Rights Agreement dated March 25, 1997 between the Company and Santa Fe Pacific Gold Corporation (filed with the Company's Annual Report on Form 10-K dated March 27, 1997).	
10.1*	Amended and Restated Directors Stock Option Plan (filed with the Company's Form S-8 Registration No. 333-00349 on January 22, 1996).	
10.2*	Amended and Restated Employee's Stock Option Plan (filed with the Company's Form S-8 Registration No. 333-00403 on January 22, 1996).	
10.3*	1995 Stock Incentive Plan (filed with the Company's Form S-8 Registration No. 333-00405 on January 22, 1996).	
10.4*	Non-Qualified Stock Option Agreement dated August 16, 1995, between the Company and Leland O. Erdahl (filed with the Company's Annual Report on Form 10-K dated March 27, 1996).	
10.5*	Non-Qualified Stock Option Agreement dated May 25, 1995, between the Company and George R. Ireland (filed with the Company's Annual Report on Form 10-K dated March 27, 1996).	
10.6*	Non-Qualified Stock Option Agreement dated May 25, 1995, between the Company and James B. Tompkins (filed with the Company's Annual Report on Form 10-K dated March 27, 1996).	
10.7*	Stock Option Agreement dated March 6, 1995 between the Company and James P. Congleton, as amended on May 25, 1995 (filed with the Company's Annual Report on Form 10-K dated March 27, 1996).	
10.8*	Warrant to Purchase Common Stock dated May 25, 1995, between the Company and Grant Bettingen, Inc. (filed with the Company's Annual Report on Form 10-K dated March 27, 1996).	
10.9*	Non-Qualified Stock Option Agreement dated July 31, 1995, between the Company and Wallace M. Mays (filed with the Company's Form S-8 Registration Statement No. 33-64481 on November 21, 1995).	

Exhibit Number	Description	Sequentially Numbered Page
10.10*	Contract dated as of November 17, 1987 and amended as of May 29, 1992 by Hydro Resources, Inc., a wholly-owned subsidiary of Uranium Resources, Inc., and Public Service of New Mexico (filed with the Company's Form 8 - Amendment to Application or Report as filed with the Securities and Exchange Commission on December 9, 1988).(1)	
10.11*	Contract for the Purchase of Natural Uranium Concentrates (U3O8) dated April 5, 1994 between Uranium Resources, Inc., URI, Inc. and Pacific Gas & Electric Company (filed with the Company's Annual Report on Form 10-K for the year ended December 31, 1994).(1)	
10.12*	Agreement for the Sale of Uranium Concentrates dated as of August 23, 1990 between OES Fuel, Incorporated, Uranium Resources, Inc. and URI, Inc. (filed with Post-Effective Amendment No. 3 to the Company's Form S-1 Registration Statement as filed with the Securities and Exchange Commission on December 7, 1990).(1)	
10.13*	U3O8 Sales Agreement dated September 30, 1988 between GPU Nuclear Corporation and URI, Inc. guaranteed by Uranium Resources, Inc. (filed with the Company's Form 8 - Amendment to Application or Report as filed with the Securities and Exchange Commission on December 9, 1988)(1).	
10.14*	Summary of Supplemental Health Care Plan (filed with Amendment No. 1 to the Company's Form S-1 Registration Statement (File No. 33-32754) as filed with the Securities and Exchange Commission on February 20, 1990).	
10.15*	Note and Warrant Purchase Agreement entered into May 25, 1995 by and among Lindner Investments, Lindner Dividend Fund and the Company (filed with the Company's Current Report on Form 8-K dated May 25, 1995).	
10.16*	Loan Agreement entered into June 18, 1996 by and between Lindner Dividend Fund and the Company (filed with the Company's Annual Report on Form 10-K dated March 27, 1997).	
17*	Uranium Concentrates Sales Agreement dated August 28, 1996 by and between the Company and Georgia Power Company (filed with the Company's Quarterly Report on Form 10-Q/A-2 for the quarter ended September 30, 1996).(1)	
10.18*	Uranium Concentrates Sales Agreement dated August 21, 1996 by and between the Company and Commonwealth Edison Company (filed with the Company's Quarterly Report on Form 10-Q/A-2 for the quarter ended September 30, 1996).(1)	
10.19*	Agreement of Santa Fe Pacific Gold Corporation as Uranco, Inc. Shareholder with the Company and Guarantee of the Company dated as of March 25, 1997 (filed with the Company's Annual Report on Form 10-K dated March 27, 1997). (1)	
10.20*	Stock Exchange Agreement and Plan of Reorganization dated as of March 25, 1997 (filed with the Company's Annual Report on Form 10-K dated March 27, 1997).	

Exhibit Number	Description	Sequentially Numbered Page
10.21*	License to Explore and Option to Purchase dated March 21, 1997 between Santa Fe Pacific Gold Corporation and Uranco, Inc. (filed with the Company's Annual Report on Form 10-K dated March 27, 1997). (1)	
10.22	Amendment #1 to Nonqualified Stock Option Agreement dated November 17, 1997 between the Company and Leland O. Erdahl.	
10.23	Amendment #1 to Nonqualified Stock Option Agreement dated November 17, 1997 between the Company and George R. Ireland.	
10.24	Amendment #1 to Nonqualified Stock Option Agreement dated November 17, 1997 between the Company and James B. Tompkins.	
10.25	Compensation Agreement dated June 2, 1997 between the Company and Paul K. Willmott.	
10.26	Compensation Agreement dated June 2, 1997 between the Company and Richard F. Clement, Jr.	
10.27	Compensation Agreement dated June 2, 1997 between the Company and Joe H. Card.	
10.28	Compensation Agreement dated June 2, 1997 between the Company and Richard A. Van Horn.	
10.29	Compensation Agreement dated June 2, 1997 between the Company and Thomas H. Ehrlich.	
10.30	Compensation Agreement dated June 2, 1997 between the Company and Mark S. Pelizza.	
10.31	Note and Warrant Exchange Agreement dated March 23, 1998 between the Company and Lindner Investments.	
10.32	6.5% Secured Convertible Note for $1,500,000 dated March 23, 1998 between the Company and Lindner Investments.	
10.33	6.5% Secured Convertible Note for $4,500,000 dated March 23, 1998 between the Company and Lindner Investments.	
10.34	Warrant to Purchase Common Stock for 625,000 shares dated March 23, 1998 between the Company and Lindner Investments.	
10.35	Warrant to Purchase Common Stock for 325,000 shares dated March 23, 1998 between the Company and Lindner Investments.	
21.1	Subsidiaries of the Company.	
23.1	Consent of Arthur Andersen LLP.	
27	Financial Data Schedule	

*Incorporated by reference pursuant to Rule 12b-32 under the Securities and Exchange Act of 1934, as amended.

(1)Certain provisions have been omitted and filed separately with the Securities and Exchange Commission pursuant to a request for confidential treatment.

Exhibit C

Footnote 3

Energy Information Administration

Nuclear Power Generation and Fuel Cycle Requirements 1998

May 1998

The publication, *Nuclear Power Generation and Fuel Cycle Report* will not be printed in 1998. This website provides information and forecasts on the U.S. and world nuclear and uranium industries. The nuclear capacity projections are consistent with those in the *International Energy Outlook 1998* and the *Annual Energy Outlook 1998*. Also, the nuclear capacity and fuel cycle projections are given through 2020. Fuel cycle projections were developed using the PC version of the International Nuclear Model. The nuclear capacity projections were derived by estimating the completion dates for nuclear units under construction and planned in each country, by incorporating the capacity upgrades, and by scheduled retirements of currently operating units. In addition, the estimated dates for unit completion are based on an analysis of historical construction performance, regulatory issues, financial constraints, and regional electricity demand.

The legislation that created the EIA vested the organization with an element of statutory independence. The EIA does not take positions on policy questions. Its responsibilities are to provide timely, high-quality information and to perform objective, credible analyses in support of deliberations by both public and private decision makers. Accordingly, these projections do not purport to represent a policy position of the U.S. Department of Energy or the Administration. As part of the EIA program to provide energy information, this file provides information and forecasts important to the domestic and world nuclear

Table 1. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, Reference Case

Table 2. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, High Case

Table 3. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, Low Case

Table 4. Projected World Annual Uranium Requirements, 1998-2020

Table 5. Projected World Annual Uranium Enrichment Service Requirements, 1998 - 2020

Table 6. Projected World Annual Spent Fuel Discharges, 1998-2020

Table 7. Projected World Cumulative Uranium Requirements, 1998-2020

Table 8. Projected World Cumulative Uranium Enrichment Service Requirements, 1998 - 2020

Table 9. Projected World Cumulative Spent Fuel Discharges, 1998-2020

Appendix A. Nuclear Power Technology and the Nuclear Fuel Cycle

Appendix B. The Analysis Systems

Appendix C. Projections for Nuclear Generating Units, Reference Case, 1998 through 2020

Appendix D. U.S. Customary Units

important to the domestic and world nuclear and uranium industries.

Aadditional data will be added to this site as it is developed.

of Measurement, International System of Units (SI), and Selected Data Tables, in SI Metric Units

Glossary

Contacts

This was prepared in the Coal and Electric Data and Renewables Division, Office of Coal, Nuclear, Electric, and Alternate Fuels. Technical information regarding this report may be obtained from Dr. Z.D. (Dan) Nikodem zdenek.nikodem@eia.doe.gov , or (202) 426-1179.

For additional nuclear information in HTML format
EIA Interactive Data Query
Short Term Energy Outlook
Uranium Industry Annual 1997
Nuclear Power Generation and Fuel Cycle Report 1997
Spent Nuclear Fuel Discharged from U.S. Reactors 1994 (PDF)

File last modified: May 1998

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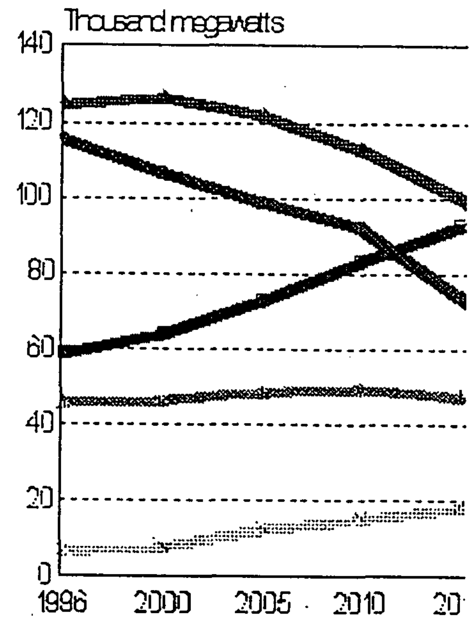
Table 1. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, Reference Case
(Megawatts)

COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	11146	11994	11994	10298	8631
UNITED STATES	100817	95605	86800	80357	63881	49217
Subtotal	115719	106751	98794	92351	74179	57848
Western Europe						
BELGIUM	5712	5712	5712	3966	3966	1015
FINLAND	2355	2610	2610	2610	0	0
FRANCE	59948	64303	62870	62870	62870	62950
GERMANY	22282	21063	20083	16120	11800	5250
NETHERLANDS	504	449	449	0	0	0
SLOVENIA	632	632	632	632	632	0
SPAIN	7207	7207	7054	6614	6614	3842
SWEDEN	10040	10040	9440	8840	6085	4148
SWITZERLAND	3077	3077	2712	2000	1030	1030
UNITED KINGDOM	12928	11772	10518	9568	7158	7158
Subtotal	124685	126865	122080	113220	100155	85393
Eastern Europe						
ARMENIA	376	376	752	752	752	752
BULGARIA	3538	3538	2722	2722	1906	1906
CZECH REPUBLIC	1648	2560	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1729	866
KAZAKHSTAN	70	70	570	500	500	500
LITHUANIA	2370	2370	2370	2370	2370	1185
ROMANIA	650	650	1300	1300	1300	1300
RUSSIA	19843	19843	20785	19832	18350	21980
SLOVAK REPUBLIC	1632	2020	1592	1592	1592	1592
UKRAINE	13765	13065	13090	14990	15577	11400
Subtotal	45621	46221	48382	49259	47548	44953
Far East						
CHINA	2167	2167	6737	11542	14700	18760
JAPAN	42369	43525	44321	47526	53623	54107
NORTH KOREA	0	0	950	1900	1900	1900
SOUTH KOREA	9120	12990	12990	14890	16234	15000
TAIWAN	4884	4884	7384	7384	6176	4280
Subtotal	58540	63566	72382	83242	92633	94047
Other						
ARGENTINA	935	935	1627	1292	1292	1292
BRAZIL	626	626	1871	1871	1871	1871
INDIA	1695	2503	3103	5913	7640	9890

1996 Operable Nuclear Capacities
Reference Case, for

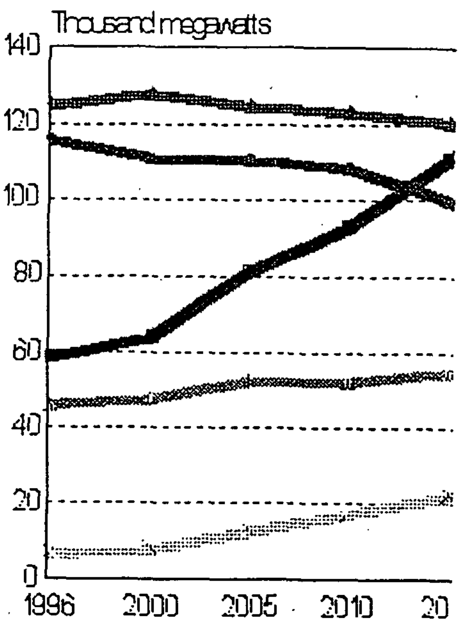


IRAN	0	0	2146	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	1308
PAKISTAN	125	425	425	600	600	600
SOUTH AFRICA	1842	1842	1842	1842	1842	1842
TURKEY	0	0	0	0	1300	1300
Subtotal	6531	7639	12322	14972	17999	20249
World Total	351096	351042	353960	353044	332514	302490

Table 2. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, High Case
(Megawatts)

COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	13024	14902	14902	12842	10298
UNITED STATES	100817	97635	95555	93525	86800	80357
Subtotal	115719	110659	110457	108427	99642	90655
Western Europe						
BELGIUM	5712	5712	5712	5712	5320	3966
FINLAND	2355	2610	2610	2610	2610	0
FRANCE	59948	64303	62870	64320	70400	76500
GERMANY	22282	21063	20723	20083	14835	10540
NETHERLANDS	504	449	449	449	0	0
SLOVENIA	632	632	632	632	632	632
SPAIN	7207	7207	7207	7054	6614	6614
SWEDEN	10040	10040	10040	10040	10040	6685
SWITZERLAND	3077	3077	3077	2712	2355	2000
UNITED KINGDOM	12928	12682	11035	9568	7768	7158
Subtotal	124685	127775	124355	123180	120574	114095
Eastern Europe						
ARMENIA	376	752	752	752	752	752
BULGARIA	3538	3538	2722	2722	2859	3812
CZECH REPUBLIC	1648	3472	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1729	1729
KAZAKHSTAN	70	70	570	570	500	500
LITHUANIA	2370	2370	2370	2370	2370	2370
ROMANIA	650	650	1300	1950	1950	1950
RUSSIA	19843	19843	22668	20785	23590	26360
SLOVAK REPUBLIC	1632	2020	2408	1592	1592	1592
UKRAINE	13765	13065	14040	15940	15940	15577
Subtotal	45621	47509	52031	51882	54754	58114
Far East						
CHINA	2167	2167	6737	11542	17160	25070
JAPAN	42369	43525	50176	54768	61870	69260
NORTH KOREA	0	0	1900	1900	1900	1900
SOUTH KOREA	9120	12990	14890	16790	21957	27987
TAIWAN	4884	4884	7384	7384	7384	6176
Subtotal	58540	63566	81087	92384	110271	130393
Other						
ARGENTINA	935	935	1627	1292	1292	1292
BRAZIL	626	626	1871	1871	3100	3100
CUBA	0	0	0	408	816	816

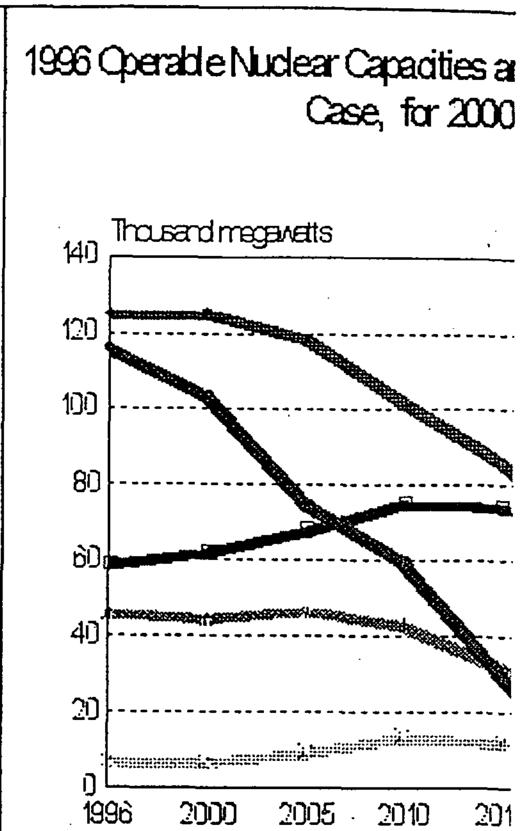
1996 Operable Nuclear Capacities a
Case, for 2000



INDIA	1695	2503	3103	5913	9180	14000
IRAN	0	0	2146	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	1308
PAKISTAN	125	425	425	600	600	600
SOUTH AFRICA	1842	1842	1842	1842	1842	1842
TURKEY	0	0	0	1300	1300	1300
Subtotal	6531	7639	12322	16680	21584	26404
World Total	351096	357148	380252	392553	406825	419661

Table 3. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, Low Case
(Megawatts)

COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	10298	10298	10298	7136	2643
UNITED STATES	100817	92653	63881	49217	22154	2320
Subtotal	115719	102951	74179	59515	29290	4963
Western Europe						
BELGIUM	5712	5712	5712	3966	2000	0
FINLAND	2355	2355	2355	1155	0	0
FRANCE	59948	64070	62870	62870	62870	56190
GERMANY	22282	20723	18916	13075	7896	1269
NETHERLANDS	504	449	0	0	0	0
SLOVENIA	632	632	632	632	0	0
SPAIN	7207	7054	6614	6614	4797	1906
SWEDEN	10040	9440	8395	4202	0	0
SWITZERLAND	3077	3077	2000	2000	1030	0
UNITED KINGDOM	12928	11352	10518	7158	7158	5908
Subtotal	124685	124864	118012	101672	85751	65273
Eastern Europe						
ARMENIA	376	376	376	0	0	0
BULGARIA	3538	3538	2722	1906	953	0
CZECH REPUBLIC	1648	1648	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1299	0
KAZAKHSTAN	70	70	0	500	500	500
LITHUANIA	2370	2370	2370	1185	1185	0
ROMANIA	650	650	650	1300	1300	1300
RUSSIA	19843	19843	20132	17397	10050	6275
SLOVAK REPUBLIC	1632	1632	1592	1592	1592	1592
UKRAINE	13765	12140	13090	13677	11400	7600
Subtotal	45621	43996	46133	42758	31751	20739
Far East						
CHINA	2167	2167	6737	11542	11542	11542
JAPAN	42369	43525	43525	43525	43205	42864
NORTH KOREA	0	0	0	950	950	950
SOUTH KOREA	9120	10730	12340	12340	13684	11939
TAIWAN	4884	4884	4884	6176	4280	2500
Subtotal	58540	61306	67486	74533	73661	69795
Other						
ARGENTINA	935	935	935	1292	1292	1292
BRAZIL	626	626	626	1871	1871	1871
INDIA	1695	1799	3103	4726	4416	4416



IRAN	0	0	1073	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	654
PAKISTAN	125	125	300	300	600	600
SOUTH AFRICA	1842	1842	1842	1842	0	0
TURKEY	0	0	0	0	0	0
Subtotal	6531	6635	9187	13485	11633	10979
World Total	351096	339752	314997	291963	232086	171749

Exhibit D

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Challenges of Electric Power Industry Restructuring for Fuel Suppliers

September 1998

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
Office of Oil and Gas
Office of Integrated Analysis and Forecasting
U.S. Department of Energy
Washington, DC 20585

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This report, *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, was prepared jointly by the Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF), the Office of Oil and Gas (O&G), and the Office of Integrated Analysis and Forecasting (OIAF) in the Energy Information Administration.

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2. Impacts of Electric Power Industry Restructuring on the U.S. Nuclear Power Industry

Introduction

Nuclear power accounts for about 13 percent of the Nation's electricity generating capacity and about 19 percent of total electricity generation.[67] As the electric utility industry is restructured, the 105 commercial nuclear power plants currently in operation will face increasing competition.[68] The prospect of having to compete on the basis of market value of electricity threatens the continued operation of a number of units. From January 1997 through January 1998, utilities have announced the retirement of five units at four plants before the expiration of their operating licenses (Table 10). In each case, the utility owner calculated that continued operation was uneconomical given the costs of operating the plant, the market value of the electricity, and the long-term prospects for making the plant economical.

The continued operation of the remaining nuclear power plants depends on the ability of each plant owner to recover operating and capital improvement (i.e., capital additions) costs.[69] If revenues under competition exceed operating and capital improvement costs, the plant will probably continue to operate. Plant owners, however, may have stranded costs because of the inability of the plant to generate revenues that fully cover sunk capital costs. By contrast, if revenues do not exceed operating and capital improvement costs and the utility has no real prospect of changing this relationship, the plant will most likely be retired or, if possible, sold to another company that believes it can make the long-run operating costs economical. These decisions and relationships take place on a unit-by-unit basis according to the specific factors affecting the unit, State, and local power market.

This chapter discusses the potential impacts of electric power restructuring on the nuclear power industry. The issues facing the industry include stranded cost recovery, market competitiveness of plants, and the funds needed to cover decommissioning costs. Potential impacts on the nuclear fuel industry are also included.

Stranded Cost Recovery

Under the regulatory frameworks that have prevailed at the State and Federal levels, utilities are permitted to recover all their prudently incurred expenses and to earn a rate of return that fairly compensates the providers of capital.[70] In a competitive market, utilities will charge market rates for their electric power. The market rates will establish the value of the utilities' nuclear assets. If they cover operating expenses but not all the capital charges, the assets will essentially be devalued, but the plants may continue to operate. If the market rates fail to cover operating expenses, however, the plants will most likely be shut down or sold.

Over the past decade, several nuclear plants have been offered for sale in whole or in part. Before prematurely retiring the Rancho Seco plant in 1989, the Sacramento Municipal Utilities District was involved in discussions

[67] Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997), p. 113, and *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), p. 89.

[68] A plant comprises one or more units. In common usage, the units are individually and collectively termed "plants." Thus, one speaks of 105 operating nuclear power plants rather than the technically correct 105 operating nuclear units.

[69] Operating costs consist of fixed operations and maintenance costs, variable operations and maintenance costs, and fuel costs. Because of regulatory requirements and operational characteristics, the overhead and fuel costs of nuclear plants are highly fixed. Capital improvement costs cover long-lasting equipment, such as steam generators.

[70] The restructuring concepts discussed in this chapter apply to all investor-owned utilities. These utilities represent about three-fourths of the plant ownership and electricity sales in the United States. The same concepts may also apply to municipal utilities and cooperatives on a case-by-case issue. Municipal utilities and cooperatives self-regulate but are subject to Federal requirements for reciprocity in providing open access and may be subject to State proposals to permit retail choice. No current Federal or State restructuring plan applies to Federal agencies, such as the Bonneville Power Administration or the Tennessee Valley Authority.

Table 10. List of Recent Nuclear Plant Closings as of January 31, 1998

Plant[a]	Location	Size (MWe)	Date of Shutdown	Status
Haddam Neck	Haddam Neck, Connecticut	560	1/97	Following an economic analysis of operations, expenses, and the cost of inexpensive replacement power, the utility—Connecticut Yankee Atomic Power Co.—felt a shutdown was the best option.
Big Rock Point	Charlevoix, Michigan	67	8/97	The plant's small size made generating electricity very expensive. Consumers Energy felt that with only 36 months remaining on its operating license, improvements to the plant that would be needed to meet future regulatory requirements would be too expensive to be economical.
Maine Yankee	Wiscasset, Maine	870	8/97	Maine Yankee Atomic Power Company cited the rising cost of safety measures which made generating electricity too expensive in a market that is opening to deregulation and therefore provides no guaranteed customer base.
Zion 1 and 2	Zion, Illinois	2,080	1/98	Commonwealth Edison Co. cites deteriorating steam generators as the reason the plant was shut down. The company said that the two nuclear units would not be able to produce competitively priced power based upon projected costs of operating and supporting the plant, the amount of electricity it was expected to generate, and the projected price of electricity under deregulation.

[a]Since January 31, 1998, utility owners have announced the early retirement of two nuclear units—Oyster Creek (619 MWe) in Fork River, New Jersey, and Millstone 1 (641 MWe) in Waterford, Connecticut.

Source: **Haddam Neck**— NucNet, "The Operators of the Connecticut Yankee Nuclear Power Plant Have Taken a Final Decision to Close Down the Unit for Financial Reasons after 29 Years of Service" December 5, 1996, Internet – Nucnet@otagbe.ch.; **Maine Yankee**—Ross Kerber, "Owners of Maine Yankee Plant Say It May Be Closed Permanently," *Wall Street Journal* (May 28, 1997), Section B4; **Big Rock Point**—News Releases from Consumers Energy, "Rock Nuclear Plant Closing" (June 11, 1997), web site www.cpco.com/news/release_274.html; **Zion**—News Briefs, "ComEd to close Zion," *Ux Weekly* (January 19, 1998), pp. 3-4.

with Duke Power, Bechtel, and others about a potential sale. In the late 1980s, Consumers Power Company evaluated selling its Palisades plant, located in South Haven, Michigan, to a consortium led by Westinghouse. In 1996 and 1997, the owners of Maine Yankee plant held discussions about selling the plant to Philadelphia Electric Company (PECO). Ultimately, none of the plants was sold.

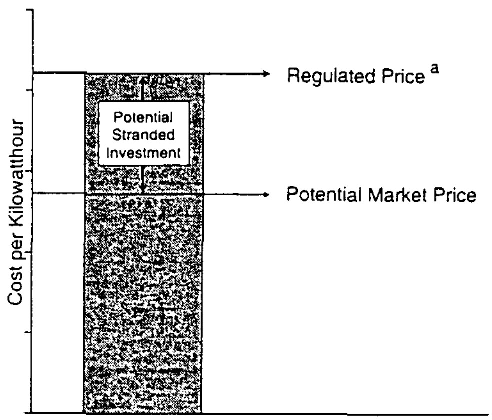
Currently, General Public Utilities (GPU) has offered for sale both its nuclear units, Oyster Creek and Three Mile Island-1.[71] On April 16, 1998, Boston Edison announced that it was seeking qualified buyers for its Pilgrim nuclear plant.[72] Potential buyers for nuclear plants are, in general, more aggressive utilities with large and successful nuclear plant operations, such as Duke Power and AmerGen, a joint venture of PECO and British Energy. As issues such as divestiture and mitigation of stranded costs become major factors in utility restructuring, more nuclear plants may be offered for purchase.

In the electric utility industry, the difference between full cost recovery under regulation and market-based income is "stranded cost." Figure 8 shows a simplified depiction of the potentially strandable nuclear cost components. With the advent of competition, utilities with high-cost nuclear units in States requiring retail competition may not be able to recover all the costs they have incurred to build the plants, the costs they are incurring to operate them, or the costs they are committed to incur to decommission them. To the extent that these costs would have been recoverable under

[71] "GPU In Serious Discussions Over TMI-1, Oyster Creek Sale," *Nucleonics Week* (September 18, 1997), p. 12.

[72] "Billing It As Hedge Against Fossil Costs, Boston Ed Puts Pilgrim Nuclear on Block," *Electric Utility Week* (April 20, 1998), pp. 11-12.

Figure 8. Simplified Depiction of Potentially Stranded Nuclear Cost



[a]Regulated market price includes: unrecovered capital cost, operating cost, fuel cost, unrecovered decommissioning cost, regulatory assets, and the cost associated with the generation of electricity.

Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

conventional cost-of-service regulation, the unrecoverable amounts will be stranded.[73]

The main assets at risk under competition are high-cost generating plants (especially, but not exclusively, nuclear), high-cost power purchase contracts, nuclear decommissioning costs, and regulatory assets.[74] Estimates of the potential size of such stranded assets range from about $30 billion to $150 billion.[75] Data Resources Incorporated estimates nuclear stranded costs at roughly $88 billion.[76] Moody's Investors Service estimates total stranded costs for 114 investor-owned utilities at $135 billion.[77] These estimates depend on many factors, including how the electric utility industry is restructured, when or if States allow retail competition, and what the current and long-term market value for power and energy is at the time of competition.

The nuclear stranded cost issue is a question of recovery—that is, how much can be recovered from ratepayers through the State procedures established through legislation or regulatory orders and how utility stock and bondholders will be affected by retail competition in electricity markets.

State Approaches to Stranded Costs

For the States that have approved retail competition, most allow full or substantial recovery of stranded capital assets, decommissioning costs, and regulatory assets incurred as of a specific date. In many cases, the accelerated recovery of stranded costs is timed to coincide with the introduction of competition at the State level. Recovery of stranded costs typically takes place over a period of about 4 to 9 years. Overall costs to ratepayers are reduced via "securitization" of the stranded cost income streams and through utility acceptance of reduced but accelerated cost recovery.[78]

All States with restructuring programs are attempting to mitigate stranded costs by aggressive cost cutting, staff reductions, and incentive pay plans. Another way to mitigate costs is to sell the stranded assets. In New England, for example, old and apparently uneconomical non-nuclear generating plants have brought much higher prices than valuations established by the selling utility or the book value of the assets. One way that this increased valuation can arise is if the acquiring utility places a high value on the land, site, and non-generating infrastructure (e.g., transmission connections) associated with the uneconomical generating assets. Because the higher value could not be realized by the continued use of the generating assets under regulation but could be realized under competition by replacing the plant with a new, more efficient plant, the revaluation of the non-generating assets may offset the devaluation of the generating assets. For nuclear assets, the primary way for the valuations to be increased is for a plant to be

[73] During the 1980s, regulators disallowed $16 billion in nuclear expenditures as imprudent (*Edison Electric Institute News*, March 6, 1997). These costs are not recoverable under regulation and thus are not strandable.

[74] Regulatory assets are assets created through the regulatory process. For example, a utility may have a portion of its plant balances ruled imprudent on the basis of the "used and useful" standard and thus excluded from the ratebase. Over time, the asset would be allowed into the ratebase as load growth made the plant "used and useful." Another example relates to "phase-in." If a regulatory commission had ordered a utility to phase-in the recovery of capital costs from a new, large power plant to avoid rate shock, the unamortized plant balances in excess of traditional amortization levels would be regulatory assets. In either case, regulatory assets are assets created by the regulatory process for later recovery by the utility.

[75] *Ibid.*

[76] Adam D. Thierer, *Electricity Deregulation: Separating Fact from Fiction in the Debate Over Stranded Cost Recovery* (The Heritage Foundation, March 11, 1997).

[77] *Ibid.*

[78] Securitization refers to the process of converting the regulatory-guaranteed stranded cost recovery income over a period of years into security, e.g., a bond that can be sold at a lower interest rate than the utility would otherwise enjoy due to the regulatory guarantee of repayment.

acquired by a more efficient operator—presumably, one with many nuclear plants and economies of scale, which can justify paying more for the asset than it is worth to the selling utility.

The following sections provide examples of State rulings on specific nuclear stranded cost items.

Capital Costs

Virtually all the more recently constructed nuclear plants, such as the Seabrook, South Texas, and Comanche Peak plants, have substantial stranded capital costs. Stranded capital costs exceeding $1 billion per unit are not unusual for units that originally cost $2 billion or more to construct. In general, States are treating stranded capital costs as fully or partially recoverable; however, no one clear theme has emerged among the States. The following approaches have been, or are about to be, implemented:

- In California, restructuring legislation passed in 1996 included recovery of transition (i.e., stranded) costs and provided for a 10-percent electricity rate reduction for residential and small commercial customers by March 31, 1998. The restructuring legislation authorized utilities to finance a portion of their transition costs with "rate reduction bonds." The maturity period of the bonds is expected to extend beyond the transition period at a below-market rate of return. In the case of Pacific Gas & Electric's (PG&E) Diablo Canyon nuclear power plant, sunken costs will be fully recovered over a period ending in 2001 at a return on common equity equal to 90 percent of PG&E's embedded cost of debt (7.52 percent in 1996).[79] For Southern California Edison (SCE), sunk costs at the Palo Verde nuclear power plant will be recovered over the same period at a 7.35-percent rate of return on ratebase.[80] Southern California Edison will also use a balancing account to pass through Palo Verde's incremental operating costs (considered reasonable so long as they do not exceed 30 percent of a baseline forecast and the site's gross annual capacity factor does not go below 55 percent). Recovery of San Onofre nuclear power plant operating costs will be on a fixed per-kilowatthour basis. This difference recognizes that SCE is the operator of San Onofre but only a minority partner of Palo Verde.[81]

- In Pennsylvania, recovery is limited to "just and reasonable" amounts, as determined prospectively by the State Public Utilities Commission (PUC). These costs, after mitigation by the utility, are to be recovered through the Competitive Transition Charge (CTC) approved by the PUC and collected from distribution customers for up to 9 years.[82]

- In New Jersey, the State is proposing that utilities have an opportunity for a limited number of years to recover stranded generating capacity costs through rates, with the intent to open the electricity market to all retail customers by July 2000. The determination of stranded cost recovery would be undertaken on a case-by-case basis—100 percent recovery of all eligible stranded costs would not be guaranteed. The opportunity for full recovery of such eligible costs would be contingent upon and may be constrained by the utility's meeting a number of conditions, including achieving the goal of delivering a near-term rate reduction to customers of 5 to 10 percent.[83] Public Service Electric & Gas (PSE&G) plans to reduce its rates by a combination of securitizing a portion of its strandable costs and extending the depreciation period of its distribution assets. Securitization involves the financing of stranded costs, up to a specified limit, by insurance of debt and subsequent liquidation of it through a surcharge on the utility's customers. The extension of the depreciation period for the distribution assets (to 45 years from 28 years) results in a theoretical increase in depreciation reserves, which PSE&G proposes to use as a partial offset for stranded generating assets.[84]

Decommissioning Costs

A large portion of the stranded costs for nuclear power plants is associated with the amount of unrecovered decommissioning costs. Currently, decommissioning costs appear to average slightly more than $400 million for a single-unit station and about $700 million for a

[79] *Ibid.*, p. 18.
[80] Southern California Edison Co., 1996 Form 10-K, p. 8.
[81] *Ibid.*
[82] PECO Energy Company, 1996 Form 10-K, p. 2
[83] Public Service Electric & Gas Co., 1996 Form 10-K.
[84] Public Service Electric & Gas Co., Form 10-Q for the quarter ended June 30, 1997.

two-unit station.[85] A major variable in decommissioning cost and timing is the cost of low-level waste (LLW) disposal, which has been increasing steadily over the past 10 years, with no clear abatement in sight.

The procedure for collecting decommissioning costs is through annual payments to a trust fund over the expected 40-year licensed operating life of the plant.[86] Because of the payment structure, utilities will not collect half of the required final balance until after the 30th year of contributions and accruals. Since more than half of the current capacity has 20 or more years of life remaining, the assets in decommissioning trusts are substantially below the estimated terminal requirements. On a national average basis, they are about one-third of the estimated terminal values.

In the past, regulatory authorities have permitted utilities to collect all or most of the decommissioning cost shortfall from ratepayers for the commercial reactors that were shut down before their operating licenses expired. Regulatory authorities generally recognize that the issue of decommissioning cost shortfalls is related in principle to the issue of unrecovered capital costs (i.e., liabilities of a plant no longer generating revenue), and they seem to treat such costs similarly.[87]

With the advent of restructuring, most States are treating decommissioning costs as fully recoverable stranded costs. For the most part, decommissioning costs that could not be covered by revenues would be recovered through a transmission charge or a charge on departing customers. The prospect for adjustments in decommissioning costs over time is unclear. Some States (e.g., Rhode Island) will allow decommissioning cost adjustments that reflect new information about the actual cost to decommission a unit. In Maine, a nuclear utility will have one opportunity to estimate and charge decommissioning costs under restructuring.[88] After that point, the utility will bear all the risk of cost increases.

Another issue in the debate over stranded nuclear decommissioning costs concerns the operating costs from the time a utility terminates commercial operation to the time it receives its possession-only license (POL). Nuclear power plant operators incur costs to maintain the plant at a commercial level. Aside from the defueling activity itself, other major cost areas are plant staffing, maintenance, security, and compliance with Nuclear Regulatory Commission (NRC) regulations.

Utilities currently treat these costs as operating costs, not decommissioning costs. For a typical operating plant with a staff of 500 to 1,500, annual transition costs could be in the range of $50 million to $150 million. Recently, POL transition periods have been on the order of 1 to 2 years. These periods should decline to 3 to 6 months for plants that shut down according to a planned retirement schedule. Plants that shut down abruptly, however, may continue to have transition periods of 2 years or more, and their transition costs could be $100 million to $250 million. Because these costs are part of nuclear operations (not decommissioning), they do not appear to be recoverable under any definition of stranded costs. Utilities will be able to recover these costs if plants are retired while still under rate regulation; however, if plants are retired in deregulated, competitive markets, the costs may not be recoverable.

Implications of Denying Stranded Cost Recovery

Although the States are establishing procedures for stranded cost recovery, those procedures may not result in full recovery of nuclear stranded costs because of time limits on recovery or the prescribed procedure for determining stranded costs. Without substantial stranded cost recovery, a significant number of nuclear utilities will suffer large losses in market value.

Three groups of nuclear utilities are at particularly high risk: utilities with heavy investments in relatively recent (and therefore relatively costly) nuclear plants; utilities with older, poorer performing units; and utilities with relatively concentrated nuclear exposure regardless of the vintage of the plants. At-risk utilities include a few very large investor-owned utilities, such as Commonwealth Edison, and a considerable number of municipal utilities and cooperatives. For example, large shares of the Catawba and McGuire plants in North Carolina and the River Bend plant in Louisiana are owned or have been owned by municipal utilities and cooperatives,

[85] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report, 1996*, DOE/EIA-0436(96) (Washington, DC, October 1996), pp. 44-47.

[86] The fund operates like an annuity, growing over time as yearly annuity payments are made along with interest earnings.

[87] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1996*, "Decommissioning U.S. Nuclear Plants," DOE/EIA-0436(96) (Washington, DC, October 1996), p. 51

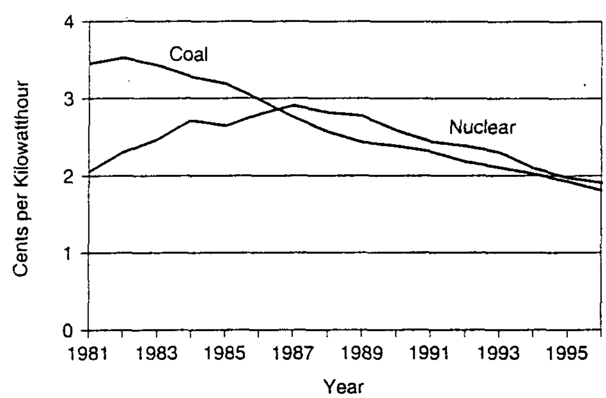
[88] "Energy Online Completes Review of Electric Deregulation Initiatives in All 50 States, Congress, Administration," www.energyonline.com/Restru..ng/news_reports/news/0819wrap.html, accessed October 23, 1997.

which are at risk as a result of asset concentration, independent of the absolute capital or operating costs of their nuclear plants.

Competitiveness of Nuclear Plants

Ultimately, the long-term viability of nuclear power generation lies in the industry's ability to keep its operating costs competitive with those for alternative forms of generation, primarily baseload coal-fired power plants. Over the past decade, the nuclear industry has succeeded in reducing average operation and maintenance (O&M) costs significantly.[89] In 1996, O&M costs, including fuel costs, reached an industry low of 1.91 cent per kilowatthour (Figure 9). Much of the decline is the result of a decade-long increase in unit capacity factors. The average capacity factor for the industry increased from 66.0 percent in 1990 to a high of 77.4 percent in 1995.[90] Over the same period, the nuclear industry continued to reduce the list of NRC issues requiring resolution, aggressively replaced steam generators and other major components causing difficulties, reduced refueling outage durations, extended operating cycles,

Figure 9. Comparison of Average O&M Costs for U.S. Nuclear and Coal-Fired Power Plants, 1981-1996

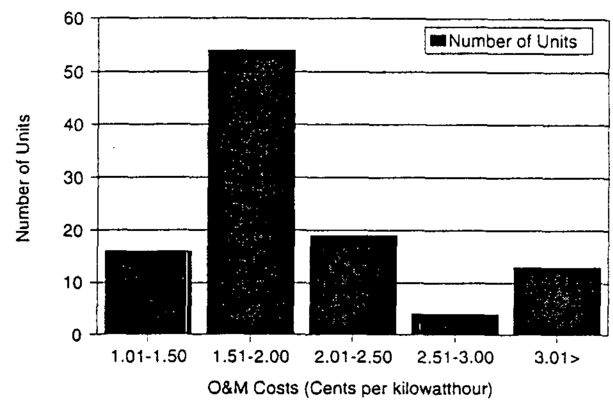


Note: Costs are in 1996 dollars. Fuel costs are included. Averages are generation weighted.
Source: Federal Energy Regulatory Commission, Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

and took other steps to improve cost and efficiency.[91] On average, O&M costs for U.S. nuclear power plants are now about the same as for U.S. coal-fired power plants, 1.81 cents per kilowatthour in 1996.[92]

Although nuclear plants are competitive with coal-fired plants on average, there are wide variations among individual nuclear units (Figure 10). For the 1994-1996 period, roughly 16 percent of the units had O&M costs exceeding 2.5 cents per kilowatthour. About 12 percent of the units had O&M costs exceeding 3.0 cents per kilowatthour. If significant additional costs must be incurred to ensure safety and reliability, some nuclear plants may cease to be competitive.

Figure 10. Variation in O&M Costs for U.S. Nuclear Plants, 1994-1996



Note: Costs are in 1996 dollars. Costs include fuel costs but exclude capital additions costs.
Source: Federal Energy Regulatory Commission, Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

Units whose operating costs approach or exceed long-term firm capacity and energy prices are at risk of early closure. In regions with substantial surplus capacity, it is possible that nuclear plants will be at risk because their operating costs are above the costs for long-term non-firm energy, which is widely available at less than 2 cents per kilowatthour.[93] For all the units, a complex analysis of the long-range competitive market is required. Issues include the prospects for reducing O&M and capital improvement costs, the prospects for

[89] Energy Information Administration, *World Nuclear Outlook 1994*, DOE/EIA-0436(94) (Washington, DC, December 1994), pp. 43-44.
[90] Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(97/03) (Washington, DC, October 1997), p. 105.
[91] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1996*, DOE/EIA-0436(96) (Washington, DC, October 1996), and *World Nuclear Outlook 1994*, DOE/EIA-0436(94) (Washington, DC, December 1994).
[92] Federal Energy Regulatory Commission, Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."
[93] Firm power is power that is intended to be available at all times, even under adverse conditions. Non-firm power does not have the guaranteed continuous availability of firm power.

increasing capacity factors, the likelihood that long-term firm power will remain available at low rates, decommissioning costs and scheduling, the projected O&M costs of competing fossil fuel generation, and cost recovery for prematurely retired units.

Many utilities, including GPU Nuclear Corporation (the owner of Oyster Creek), Commonwealth Edison (the owner of Dresden and Quad Cities), Wisconsin Public Service (the owner of Kewaunee), and Boston Edison (the owner of Pilgrim) have publicly addressed these issues, with varying results. In some cases (e.g., Oyster Creek), the utility has said that the plant will either be sold or closed, because the prospects for making it competitive are poor.[94] In other cases (e.g., Pilgrim), the utility has said that the plant will be brought up to competitive standards over the next few years and will not be retired prematurely.[95] The following section outlines some of the factors that go into these decisions.

Market Value

Under restructuring, the market value for long-term firm capacity and energy in each region of the country will determine the value of nuclear power plants. In the short term, firm capacity and energy will be available in most of the country for the incremental price of coal-fired energy from plants operated at less than baseload levels. This price is less than $20 per megawatthour in most of the country, although it is higher in some regions, such as New England. No utility, however, retires a plant with 10 to 20 years of remaining life because replacement power costs are low for the next year or two. Figure 11 shows the current average operating costs of nuclear power plants by North American Electric Reliability Council region.

Regional differences will play a major role in market value assessments. In New England, for example, coal-fired power is expensive because the coal sources are distant and the regulations governing air emissions and siting are stringent. Transmission of surplus coal-fired power from the Midwest and Mid-Atlantic would lower prices, but it is limited by the existing transmission capacity to New England, which is much less than would be optimal, given the differences in relative generating costs among the regions. Over the long term, new gas-fired combined-cycle capacity in New England and upgraded or possibly new transmission capacity to other regions, including Canada, may eliminate some of the regional pricing differences. In the Southwest, on the other hand, almost all these factors are reversed. Coal-fired power is available, transmission constraints are minimal, and surplus power is exported to Mexico. The net result is that the market value for power in the Southwest is much less than in New England.

As surplus coal-fired capacity available for baseload generation is used up in the first half of the next decade, prices may rise, making nuclear-powered generation more competitive. Prices may also rise in the early part of the next century as stringent sulfur dioxide emissions standards under the Clean Air Act take hold. New emissions standards for nitrogen oxides, as proposed by the U.S. Environmental Protection Agency in October 1997, would also significantly add to long-run operating costs. Limiting these increases in the long-run market price for baseload capacity and energy will be new combined-cycle gas-fired power plants, which can deliver power and energy at less than $40 per megawatthour, including capital recovery.

Operation and Maintenance Costs

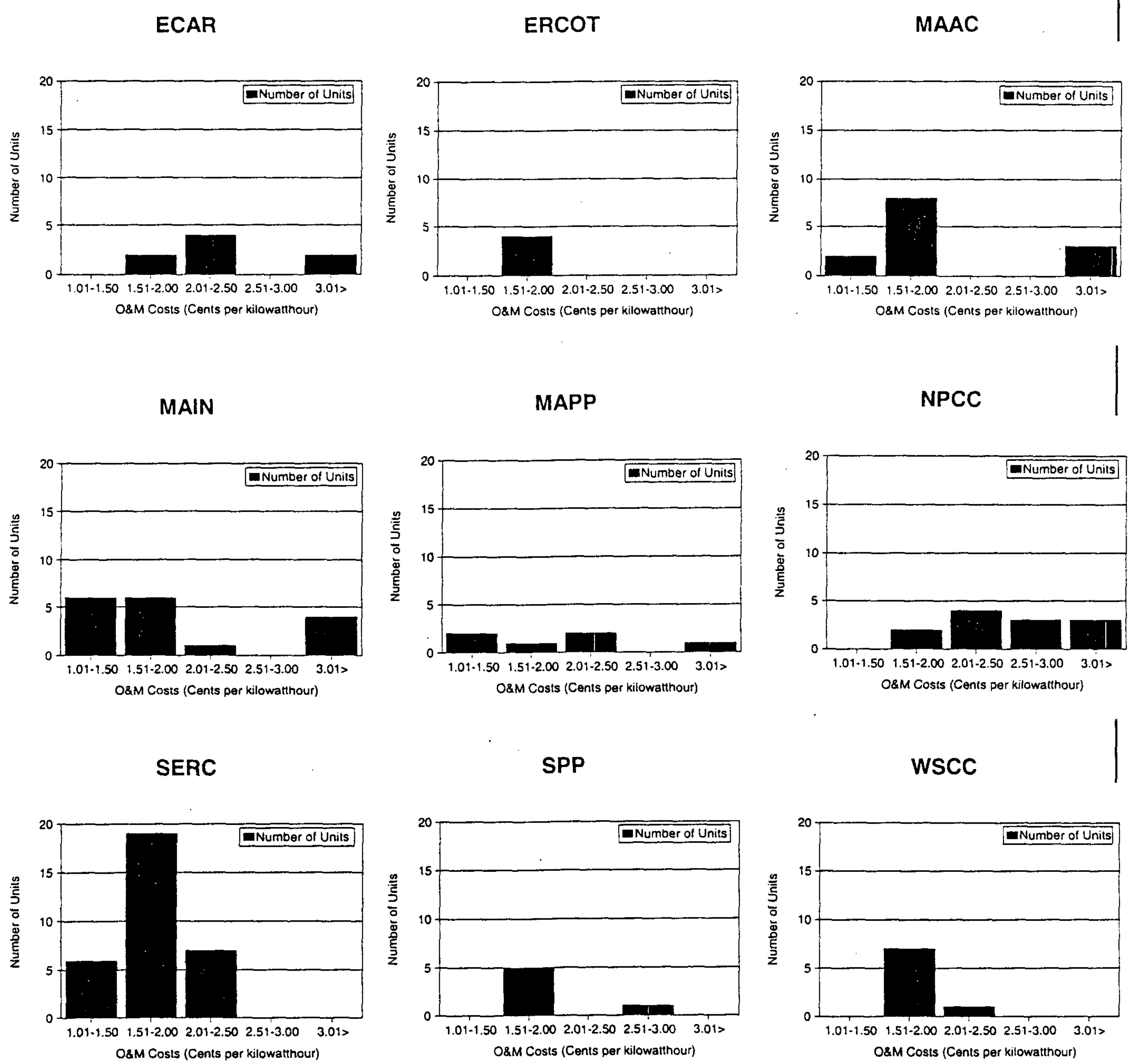
If nuclear power plants are to remain viable in deregulated electricity markets, their O&M costs will have to be maintained at the competitive levels achieved over the past decade. Factors contributing to nuclear O&M costs include plant size and age, required capital expenditures, and capacity factor.

Size

Roughly 70 percent of the O&M expenditures for nuclear units are for labor. Labor costs are largely fixed by regulatory requirements that do not relate to size. Moreover, multi-unit plants share a considerable amount of the labor relating to regulatory compliance, procurement, permitting, etc. Thus, larger units and multi-unit plants have the potential to be less costly to operate per kilowatthour than smaller units and single-unit plants. Most of the nuclear units prematurely retired or announced for premature retirement in recent years have been single-unit plants (e.g., Trojan, Rancho Seco, Maine Yankee, Big Rock Point, Oyster Creek, and Haddam Neck) and many are small units.

[94] D. Airozo, "Oyster Creek May Close in 2000, Unless a Buyer Can Be Found," *Nucleonics Week* (April 10, 1997).
[95] "Little Pilgrim Working To Avoid Fate of New England Neighbors," *Nucleonics Week* (June 19, 1997), p. 9.

Figure 11. Variation in O&M Costs for U.S. Nuclear Power Plants by NERC Region, 1994-1996



Note: Costs are in 1996 dollars. Costs include fuel costs but exclude capital additions costs.
Source: Federal Energy Regulatory Commission, Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

Age

The age of a plant is significant for several reasons. First, as a plant passes 20 or 25 years of its 40-year license life, the remaining lifetime of the plant may be too short to permit competitive amortization of the costs of major capital improvements, such as steam generator replacements. Second, older plants are usually smaller, meaning that the fixed costs of replacements are spread over fewer kilowatthours of generation. Third, older plants have often required major upgrades because of their vintage rather than their operational performance. Several units (e.g., San Onofre 1, Yankee Rowe) have been prematurely retired because they could not economically be brought up to current standards while remaining economical. On the other hand, one unit—Robert Ginna, a 470-megawatt unit in Rochester, New York—had its steam generators replaced in 1995 because the utility, Rochester Gas and Electric Corporation, determined that the plant's long-run economics were favorable.

Large Capital Expenditures

Another major factor in determining a plant's competitiveness is whether significant capital expenditures will be needed in the near future for continued operation. Such capital expenditures are not sunk costs and, in a competitive marketplace, must be included in the cost of electricity generation. A plant that is currently competitive but is anticipated to require a large influx of capital in the next several years is a less desirable economic asset and may simply be operated until a large capital infusion is needed and then shut down.

The largest capital expenditure typically facing existing nuclear plants (pressurized-water reactors only) is the cost to replace degraded steam generators.[96] As a result of degraded steam generators, Commonwealth Edison announced in January 1998 that it was permanently shutting down its Zion plant.[97]

Capacity Factor

The capacity factor of a nuclear power plant has a significant impact on the cost of power from the plant. Although O&M costs usually are seen as variable costs, they are essentially fixed for any operational nuclear power plant. Nuclear fuel costs are also mostly fixed. Thus, most of the change in the capacity factor goes directly to the bottom line of the utility's income statement. For a 1,000-megawatt plant selling power at $25 per megawatthour, each capacity factor point generates $2.2 million in revenue per year and only slightly less in before-tax net income. The net present value of this percentage point change over a typical 20-year remaining life is $15 million to $20 million, depending on the discount rate. Not surprisingly, utilities are willing to make investments to improve plant performance. Similarly, the possibility of multi-point increases in capacity factors is a major influence on the retirement decision. For plants that have historically operated far below the industry average capacity factor (currently in the mid- to upper 70s), the prospect of a double-digit increase in capacity factors may justify expenditures to improve performance.

Decommissioning Assurance

Restructuring of the electricity industry introduces issues that concern the NRC and its relationship to utilities demonstrating financial assurance for decommissioning funds. The current NRC rule is based on the premise that the operator of a nuclear power plant will be an ongoing, capital-intensive concern with significant financial resources, including ratebase access, to cover any shortfall in the plant's decommissioning fund.[98]

With the advent of restructuring, utilities will no longer have a guaranteed customer base. Most State commissions have accepted full recovery for decommissioning costs, but it is unclear how the costs will be translated into rates or charged to existing and former customers. In addition, it is unclear how future increases in decommissioning costs could or would be passed on to former customers.

The NRC has statutory authority to regulate the decommissioning of its licensed nuclear facilities. On April 8, 1996, the NRC posted an announcement in the *Federal Register* soliciting public comment for a proposed rulemaking, stating it is considering rulemaking that would:

- Require that electric utility reactor licensees assure the NRC that they can finance the full estimated cost of decommissioning if they are no longer subject to rate regulation by State agencies or by the Federal Energy Regulatory Commission and do not have a guaranteed source of income.

- Require utility licensees to report periodically on the status of their decommissioning funds. The present rule has no such requirement because State

[96] The replacement of steam generators for a pressurized-water reactor between 1994 and 1995 cost between $125 million and $153 million.

[97] "ComEd To Close Zion," *The Ux Weekly* (January 19, 1998), p. 3.

[98] The NRC may require accelerated funding of a reactor's decommissioning fund if the operator's bond rating is below "A" by a national rating agency for a specific period of time. The NRC may consider other financial criteria in arriving at its decision. Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1996*, DOE/EIA-0436(96) (Washington, DC, October 1996), p. 49.

and Federal rate-regulating bodies actively monitor the funds. A restructured nuclear utility would have no such monitoring.[99]

The proposed rulemaking would assign financial oversight to the NRC by requiring licensees to report periodically the status of their decommissioning funds to the NRC. Whether the final rule does grant this authority to the NRC remains to be seen. In the past, however, the nuclear industry has resisted any proposals that would give NRC financial oversight responsibility.

Impacts on the Nuclear Fuel Industry

To produce fuel suitable for loading into a nuclear power plant's reactor core, naturally occurring uranium must undergo the following manufacturing steps: (1) extracting and processing ore to produce uranium concentrate (U_3O_8), (2) conversion, (3) enrichment, and (4) fuel fabrication (see textbox, p 35). These steps are referred to as the "front end" of the nuclear fuel cycle. In contrast, the management of spent fuel discharged from reactors is referred to as the "back end" of the nuclear fuel cycle. Products or services for each front-end stage are bought and sold in separate markets. Available capacity, inventory level, and the application of trade restrictions and other national policies differ from market to market. Consequently, trends in prices may show little correlation between markets. For example, the average annual spot-market price for the restricted U.S. uranium market increased by 36 percent from 1995 to 1996, compared with an increase of only 6 percent in the average annual spot-market price for the restricted U.S. enrichment market.[100, 101, 102]

The restructuring of the electric power industry is expected to affect the demand for nuclear fuel as uneconomical plants are retired early and the operators of the remaining plants focus on the marginal costs of power production. This section describes the potential impacts that the restructuring of the electricity industry will have on the nuclear fuel industry in the following areas: (1) changing emphasis on fuel costs, (2) declining demand for uranium and nuclear fuel services, (3) availability of uranium made surplus by plant closures, (4) decrease in inventories, (5) consolidation in nuclear fuel procurement, and (6) consolidation in the nuclear fuel industry.

Changing Emphasis on Fuel Costs

Unlike nonfuel O&M and capital additions costs, the cost of fuel has not been considered critical in determining the economic viability of existing nuclear power plants. Factors contributing to this view include: (1) fuel represents a relatively small share of power production costs; (2) fuel has been priced at historically low levels; and (3) utilities, operating as regulated monopolies, have generally been able to pass through fuel costs to customers. With the restructuring of the electric power industry, nuclear generating companies will be selling a commodity (electricity) in a highly competitive marketplace with little opportunity to differentiate their product other than by price. In this setting, they will be forced to focus on the incremental costs of production, including those for fuel, to remain competitive.

Fuel composed just 27 percent of the average nuclear power production expenses reported by major U.S. investor-owned utilities in 1996.[103] The remaining 73 percent of average nuclear production expenses was categorized as non-fuel O&M. In contrast, fuel contributed to a much greater share of the average power production expenses incurred by fossil steam, gas turbine, and small-scale plants (Figure 12).[104]

A general condition of oversupply has kept the prices of uranium and nuclear fuel cycle services at historically low levels (Figure 13).[105] The average annual spot-market price for the U.S. uranium market has declined to levels substantially lower than in the late 1970s, in sharp contrast to the substantial increases in nonfuel O&M

[99] NRC Press Release, NRC Electronic Bulletin Board on FEDWORLD, www.fedworld.gov (April 8, 1996).

[100] Historical uranium and enrichment spot-market prices used in this chapter are the Exchange and SWU Values, respectively, reported in TradeTech, *The Nuclear Review* (Denver, CO).

[101] In the spot market, transactions are made for the one-time delivery of the entire contract to occur within 1 year of contract execution. Term contracts are typically made for one or more deliveries to occur over a time period in excess of 1 year from contract execution.

[102] Due to restrictions on U.S. imports from republics of the former Soviet Union, a two-tiered market for uranium, consisting of restricted U.S. and unrestricted world components, was established in 1992.

[103] Federal Energy Regulatory Commission, FERC Form 1, "Annual Report of Major Electric Utilities, Licensees and Others" (1996).

[104] The gas turbine and small scale category includes gas turbine, internal combustion, photovoltaic, and wind plants.

[105] The nuclear fuel cycle includes the steps necessary for transforming naturally occurring uranium into fuel loaded into nuclear reactors.

Characteristics of Nuclear Fuel

1. Multiple Production Stages and Markets

Four major stages are involved in the transformation of naturally occurring uranium into the fuel assemblies that are loaded into a typical nuclear power reactor operating in the United States. These stages, collectively referred to as the "front end" of the nuclear fuel cycle, and their associated products, each sold through separate markets, are as follows:

- *Ore mining and processing*: production of uranium concentrate (U_3O_8 or yellowcake) from ores and solutions recovered from the earth.
- *Conversion*: U_3O_8 is converted into uranium hexafluoride (UF_6), a feedstock required for enrichment.
- *Enrichment*: the fissile content of natural uranium (0.7 percent ^{235}U) is increased to low-enriched uranium (generally 3.0-5.0 percent ^{235}U), suitable for reactor fuel. A utility typically contracts to have uranium enriched by a provider of enrichment services. The energy required for enrichment is measured in separative work units. Low-enriched uranium, known as enriched uranium product, also can be purchased directly from the marketplace.
- *Fuel Fabrication*: Fabricators manufacture fuel assemblies containing fuel rods loaded with uranium oxide (UO_2) pellets made from low-enriched uranium.

2. Five-year Useful Life

Nuclear fuel assemblies are designed to be used for up to 5 years, depending on the reactor operating cycle, burnup[a] rates, and other fuel management practices. The acquisition cost of nuclear fuel is accounted for as an asset on a utility's balance sheet, since nuclear fuel loaded into a reactor provides future economic benefit. A portion of the acquisition cost is allocated to each year in which the fuel provides benefit. This allocation, generally referred to as amortization, is deducted from the asset account on the balance sheet and added as a fuel expense to the income statement.

3. Internalization of Environmental Costs Incurred from Its Use

Nuclear fuel that has reached the end of its useful life is discharged from reactors during refueling in a manner that prevents contamination of the environment. This discharged fuel, termed "spent" fuel, is highly radioactive. It currently is being held by U.S. utilities at reactor sites, either under water in storage pools or in dry cask storage facilities, until a repository is made available for its permanent disposal. The management of spent fuel comprises the "back end" of the nuclear fuel cycle. Under the Nuclear Waste Policy Act of 1982, as amended, the U.S. Department of Energy (DOE) is to provide for the ultimate disposal of spent fuel waste. To fund the DOE's contractual obligations, each nuclear utility pays an ongoing fee, in addition to a one-time payment to cover disposal of fuel utilized prior to April 7, 1983. The annual fee is currently 1 mill per kilowatthour of net electricity generated and sold; it is included in the fuel expenses reported to the Federal Energy Regulatory Commission. Also, owners of nuclear power plants are required by the U.S. Nuclear Regulatory Commission to place funds into an external trust to provide for the cost of decommissioning the radioactive portions of plant and equipment. Thus, the costs incurred to ensure that nuclear waste does not contaminate the environment are included, or "internalized," in the cost of nuclear power.

4. Relationship to Nuclear Nonproliferation and Arms Reduction Programs

Critical components of nuclear weapons, especially highly enriched uranium (^{235}U content greater than 20 percent) and plutonium, can be produced in the same type of facilities used for the civilian nuclear fuel cycle. To provide safeguards against the spread of nuclear weapons, the United States and 185 other nations have signed a Non-Proliferation Treaty (NPT) with the International Atomic Energy Agency, an organization within the United Nations. The NPT requires detailed accounting of nuclear materials by signatory nations. With the end of the cold war, Russia and the United States have declared surplus a portion of their respective nuclear weapons arsenals. As a result of an agreement signed between the United States and Russia in 1993, the first fuel from highly enriched uranium (HEU) taken from dismantled Russian nuclear warheads was delivered to a U.S. electric power utility in November 1995. Nuclear fuel derived from U.S. HEU is scheduled to enter the market in 1998. In 1997, the DOE began selling surplus commercial-grade uranium that was intended for defense purposes. Plutonium from dismantled U.S. nuclear weapons could become available for use in commercial nuclear fuel after 2000.

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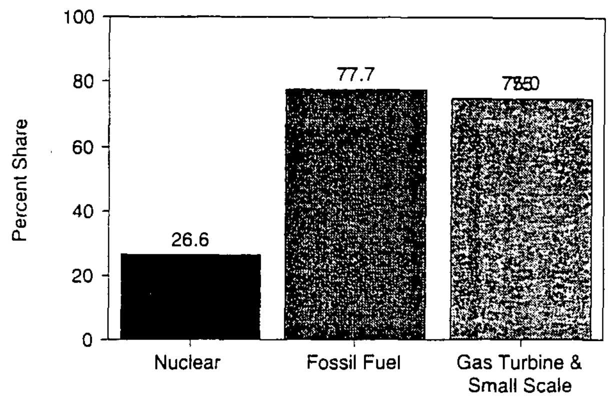
[a]Burnup is a measure of the amount of energy obtained from fuel in a reactor.
Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

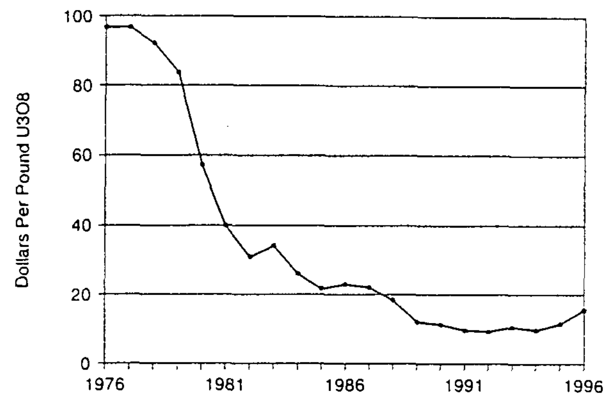
Figure 12. Fuel as a Share of Average Power Production Expenses for Plants Owned by Major U.S. Investor-Owned Electric Utilities, 1996



Notes: Power production costs include operating and maintenance (O&M) as well as fuel. Nuclear fuel expense includes payments for disposal of spent nuclear fuel waste.

Source: Federal Energy Regulatory Commission, FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

Figure 13. Spot-Market Price for the U.S. Uranium Market, 1976-1996



Notes: Price is in 1996 dollars. A two-tiered market developed at the end of 1992 as a result of agreements between the United States and the republics of the Former Soviet Union (FSU) that restrict U.S. imports of uranium from the FSU.

Source: The reported price is the Exchange Value for the restricted U.S. market reported in TradeTech, *The NUCLEAR Review* (Denver, CO, October 1997).

costs reported by nuclear power plants during the 1980s (Figure 9). There is excess production capacity in both the enrichment and fuel fabrication markets. The current world enrichment services capacity is estimated at 49.5 million separative work units (SWU), compared to 33.9 million SWU projected to be required by the world's nuclear reactors in 1998.[106, 107, 108] The current world capacity for light-water reactor fuel fabrication has been estimated at 150 percent of requirements.[109, 110] The market conditions responsible for low prices have enabled utilities to exercise a certain amount of leverage in negotiating favorable contract terms for the purchase of uranium and nuclear fuel cycle services.

- As regulated monopolies, utilities were able to pass through fuel costs to customers as long as such costs were determined to be prudent by State public utility commissions; however, the move toward full competition will make it increasingly difficult for nuclear generating companies to recover above-market generation costs. For example, some States have implemented performance-based ratemaking in exchange for allowing utilities to accelerate the recovery of their stranded costs as a transition to full competition (see text box on page 37). Performance-based ratemaking affects the profits of utilities by setting a level of operating revenues available to utilities for covering the day-by-day costs of generating electricity. To realize a profit, the utility must keep its production costs below the available revenue limit. However, the fixed portion of production costs, such as those for engineering and plant safety, are considered as unavoidable. Therefore, a nuclear generating company must focus on the variable portion of production costs, including fuel, to improve profit margins.

Declining Demand for Uranium and Nuclear Fuel Services

As nuclear capacity is retired prematurely for competitive reasons, the demand for uranium and nuclear

[106] Separative Work Unit (SWU) is the standard of measure for enrichment services.

[107] Enrichment plant capacity from NAC International, *Nuclear Industry Status Report on Enrichment, A Fuel-Trac Product* (Norcross, GA, February 1997), Table B-3.1.

[108] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Table F3.

[109] The majority of the world's nuclear power reactors are light water reactors.

[110] Fuel fabrication capacity utilization from Energy Resources International, Inc., *1997 Nuclear Fuel Cycle Supply and Price Report* (Washington, DC, May 1996), p. 7.1.

California's Move to Competitive Electric Power Market Highlights Fuel Costs

The following description of legislation in California and its impact on a nuclear utility is presented to illustrate the changing focus on fuel costs as the electric power industry undergoes restructuring. The passage of Assembly Bill 1890 in 1996 provided the legal framework to establish a fully competitive electricity generation market in California by 2002. A key provision of the restructuring legislation authorizes utilities to recover certain generation-related costs that are likely to become stranded in a competitive marketplace. The recovery would take place during the transition period (1997-2001) preceding full competition. For example, Pacific Gas & Electric Company (PG&E) will accelerate the recovery of costs for its Diablo Canyon nuclear power plant over 5 years, instead of over the previous amortization period ending in 2016.

To provide for the accelerated recovery of costs considered as stranded, customers would continue to pay prices for electricity similar to those in effect before the adoption of the restructuring legislation. In return, PG&E would receive a reduced return on common equity for those costs. The lower return reflects the reduced risk associated with increased certainty of recovering costs over a shorter period. In addition to accelerated cost recovery, revenues would be unbundled for application to distribution, transmission, public purpose programs, generation, nuclear decommissioning, and other areas.

The revenues made available annually to PG&E for the recovery of ongoing operating costs and capital additions for Diablo Canyon will be based on the Incremental Cost Incentive Price (ICIP) established by the California Public Utilities Commission (CPUC) in May 1997. The ICIP is scheduled to increase periodically from 3.26 cents per kilowatthour in 1997 to 3.49 cents per kilowatthour in 2001. In determining the ICIP, the CPUC used an assumed capacity factor of 83.6 percent for Diablo Canyon and an escalation factor of 1.5 percent. The ICIP also contains a prudence disallowance of approximately $70 million for the undepreciated portion of costs attributed to unreasonable construction error.

The price paid by customers of PG&E in California for electricity generated by the Diablo Canyon plant peaked at around 11 cents per kilowatthour in 1994. At peak prices, the operating revenue for each reactor under 100 percent power was over $3 million per day. Because of the longer amortization period available prior to restructuring, much less revenue was applied on an annual basis to recovering costs that are now considered as stranded. Thus, the operation of Diablo Canyon provided a substantially greater margin of profit than is possible today. The cost of fuel, including interest and the spent fuel fee, was only about 3.5 percent of the price paid by customers in 1994.

Because the operation of Diablo Canyon realized a large profit margin, PG&E did not have to be overly concerned about cost management as long as the plant was producing electricity. In contrast, the accelerated recovery of costs and the imposition of the PCIP as a result of restructuring will inhibit Diablo Canyon's contribution to corporate profits. PG&E estimates that the operating revenue provided from each reactor will be reduced to only $0.8 million per day in 1997.

Diablo Canyon's production cost was about 2.9 cents per kilowatthour at the beginning of 1997, compared with the operating revenue of 3.26 cents per kilowatthour established by the PCIP for 1997. For Diablo Canyon to contribute to corporate profits during the transition period, it must keep production costs below the PCIP. Thus, considerable emphasis will be placed on the management of production costs. In this context, the cost of fuel, which currently makes up about 15 percent of Diablo Canyon's production costs, becomes increasingly relevant.

In 2002, the electric power generation market is expected to be fully competitive in California. With the completion of accelerated recovery of stranded costs, Diablo Canyon's asset value will have been depreciated to zero. With the exception of decommissioning costs, customers will no longer be subsidizing above-market generation costs. To improve the operating efficiency of Diablo Canyon, PG&E plans to increase the duration of each reactor's operating cycle, measured as the time between refueling outages, from 18 months to 24 months by 2001. With fewer planned outages, O&M costs are expected to be reduced. Although the overall cost of power production will decline, the cost of fuel will actually rise, because increased performance of nuclear fuel is required for the longer operating cycle. Thus, fuel will become an even more significant component of production costs.

Sources: Pacific Gas & Electric Corporation, 10-K Report to the Securities and Exchange Commission (March 5, 1998), pp. 23-25; J. Sellers, "Strategies for Competition and Nuclear Fuel," paper presented at the Nuclear Energy Institutes's FuelCycle 97 conference (April 1997).

fuel services will be reduced in the United States. For example, the closure of the Zion 1 and 2 nuclear power generating units, announced by Commonwealth Edison in January 1998, will reduce U.S. annual requirements for uranium and enrichment services by about 1.0 million pounds U_3O_8 and 250,000 separative work units (SWU), respectively.[111] Each Zion unit had a generating capacity of 1,040 net megawatt-electric (MWe) and was operated on an 18-month refueling cycle. Commonwealth Edison is expected to use uranium that was being held for future fuel reloads at Zion as supply for its reactors remaining in operation.[112]

Because of differences in the types of reactors and management policies, not all reactors are operated in the same way. For this analysis, fuel cycle requirements for the Zion units are assumed to approximate those for plants with a similar generating capacity. Based on this assumption, uranium and enrichment services requirements would be reduced by about 500,000 pounds U_3O_8 and about 125,000 SWU, respectively, for each 1,000-MWe increment of net generating capacity retired from service. Thus, the closure of a 1,000-MWe nuclear unit would have only a marginal impact on total U.S. requirements, which are projected to be 49.4 million pounds U_3O_8 and 11.1 million SWU for 1998.[113] Similarly, requirements for conversion and fuel fabrication services would be affected only marginally.

From the perspective of the U.S. nuclear fuel supply industry, however, each plant closure represents the loss of an actual or potential customer in a highly competitive marketplace. Plant closures could have a detrimental impact on suppliers that have relatively high marginal costs of production or have large shares of their business concentrated in the United States. The following discussion focuses on the U.S. uranium and enrichment service industries.

Because of differences in the quality of ore reserves, uranium concentrate (U_3O_8) is more expensive to produce in the United States than in such countries as Australia and Canada. In addition, to earn foreign exchange, the Commonwealth of Independent States and other countries have supplied uranium to utilities in the United States from mines that might not be economical to operate under U.S. accounting principles.[114] Driven by competitive pricing, imports have become the most important source of uranium for meeting U.S. requirements. The equivalent of 43.0 million pounds U_3O_8 was imported by U.S. suppliers and utilities in 1997.[115] [116] In contrast, domestic uranium concentrate production was 5.6 million pounds U_3O_8 in 1997.[117]

A decline in demand brought about by nuclear power plant closings could weaken the price of uranium, forcing producers with marginal production costs above the market price to suspend operations. Under a scenario of declining price, relatively higher cost U.S. production would be particularly susceptible to competitive pressures exerted by imports.

The United States Enrichment Corporation (USEC), the only domestic provider of enrichment services, reported that contracts with U.S. utilities accounted for more than 60 percent of its total worldwide sales in 1996.[118] It provided enrichment services to four-fifths of the domestic nuclear power generating industry in 1997.[119] Thus, USEC's earnings would be more sensitive to closings of U.S. nuclear power plants than would those of enrichers with less exposure to the U.S. market. Because enrichment services are sold under long-term contracts, USEC could be challenged to find new customers should the domestic market be substantially reduced.

Availability of Uranium Made Surplus by Plant Closures

With restructuring, some companies may completely exit the nuclear power generation industry. If they do, they are likely to sell inventories of uranium no longer needed to meet previously scheduled fuel reloads. For example, inventory equivalent to approximately 500,000

[111] *The Ux Weekly* (January 19, 1998), pp. 3-4.
[112] *Ibid.*
[113] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Tables F1 and F3.
[114] Energy Information Administration, *Uranium Industry Annual 1991*, "The Uranium Industry of the Commonwealth of Independent States," DOE/EIA-0478(91) (Washington, DC, October 1992), p. 11.
[115] Energy Information Administration, *Uranium Industry Annual 1997*, DOE/EIA-0478(97) (Washington, DC, April 1998), Table 28.
[116] Uranium imports included U_3O_8, UF_6, and enriched uranium product (see text box, p. 35). For comparative purposes, the various forms of uranium are expressed as "equivalent" U_3O_8.
[117] Energy Information Administration, *Uranium Industry Annual 1997*, DOE/EIA-0478(97) (Washington, DC, April 1998), Table 5.
[118] United States Enrichment Corporation, *1996 Annual Report*, p. 22.
[119] United States Enrichment Corporation, "About USEC," website www.usec.com/about.html (accessed March 5, 1998).

pounds U_3O_8 became surplus as a result of the decision by Connecticut Yankee Atomic Power Co. (CYAP) to close the Haddam Neck nuclear power plant permanently. This quantity of uranium is equivalent to about 9 percent of the 5.6 million pounds of uranium produced in the United States during 1996.[120] In August 1997, Northeast Utilities, the parent company of CYAP, sold the uranium through an auction.

The sale of uranium made surplus by the closure of nuclear power plants displaces other sources of supply. The extent to which surplus uranium impacts the market depends on the timing and mechanism involved in selling the uranium. At the time that Northeast Utilities announced its intent to sell uranium made surplus by the closure of Haddam Neck, the uranium market had experienced a significant decline in price. The monthly spot-market price for the restricted U.S. market declined from $16.50 per pound U_3O_8 in July 1996 to $10.20 per pound U_3O_8 in August 1997. During the third quarter of 1996, the demand for uranium on the spot market reached a low not recorded since 1988.[121]

In addition to Northeast Utilities, the U.S. Department of Energy (DOE) announced plans to sell uranium that had been declared surplus.[122] The planned sales contributed to the downward pressure on price, with other sellers offering uranium at prices lower than the prevailing spot-market price in order to complete sales, before Northeast Utilities and DOE entered the market. By using an auction, however, Northeast Utilities was in a position to decline bids that were below the prevailing spot-market price. Buyers anticipating no further decline in spot-market price provided bids at or above the prevailing market to procure uranium at relatively low prices.[123] Prospective buyers apparently withheld demand until they perceived that the anticipated sales of surplus uranium would no longer push prices lower. Following sales of uranium by both Northeast Utilities and DOE, the spot-market price for the restricted U.S. market rose to $12.75 per pound U_3O_8 in October 1997.

Decrease in Inventories

In a competitive business environment, companies have historically sought to minimize inventory holding costs. For example, it is well documented that U.S. automobile manufacturers have met this goal by matching the delivery of parts from suppliers with assembly activities. This strategy has been popularly referred to as "just-in-time" delivery management. In contrast, nuclear utilities historically have favored the maintenance of inventories in excess of immediate fuel requirements.

Inventories of uranium are managed by utilities as part of work-in-process or "pipeline" materials required for the preparation of nuclear fuel to be loaded into the core of reactors.[124] In addition to the pipeline category, utilities also hold strategic inventories that could be used to minimize possible disruptions in supply, as well as hedging inventories used to take advantage of movements in uranium spot-market prices. Countries distant to uranium supply or nuclear fuel cycle services are more likely to hold strategic inventories. In contrast, some utilities in the United States, beginning in the 1980s, have held only inventories of the magnitude needed in the pipeline for a particular fuel reload.[125] Nevertheless, U.S. utilities have acquired excess inventories to hedge against a rise in prices. For example, discretionary purchases made in 1995 to hedge against a possible price rise contributed to an increased volume of spot-market transactions and the first increase in U.S. utilities' year-end inventories since 1983.[126]

As the electric power industry moves toward competitive retail markets, nuclear generating companies are likely to minimize inventory holding costs for both economic and regulatory considerations. Public utility commissions are likely to increase the regulatory oversight of fuel costs as they authorize nuclear utilities to recover potentially strandable costs before the onset of fully competitive markets while, at the same time, minimizing the impact on customers. As a result,

[120] Energy Information Administration, *Uranium Industry Annual 1997*, DOE/EIA-0478(97) (Washington, DC, April 1998), Table 5.

[121] "Third Quarter Spot U_3O_8 Review," *The Ux Weekly* (October 13, 1997), p. 1.

[122] Energy Information Administration, *Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects*, DOE/EIA-0619 (Washington, DC, May 1998), p. 37.

[123] "The Auction Season (and Its Aftermath)," *The Ux Weekly* (September 8, 1997), p. 1.

[124] Some utilities sell nuclear fuel to another corporation and lease it back for use in reactors.

[125] R. McKeon, and J. Stefanko, "Uranium Procurement at Pennsylvania Power and Light Company (One Utility's Perspective)," paper presented at the U.S. Council of Energy Awareness International Uranium Seminar (September 1989).

[126] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), p. 22.

nuclear power plant operators may not be able to recover their traditional out-of-core inventory holding costs.[127]

To reduce inventory holding costs, the operators of nuclear power plants are expected to seek more flexible delivery schedules from nuclear fuel cycle vendors. Lead times for delivering uranium to each successive nuclear fuel cycle stage will be reduced. In a competitive marketplace, it will be important for fueling outages to coincide with low power market prices. This will require fuel deliveries to be flexible enough to meet the timing of the outages.

Enriched uranium product (EUP) is expected to be used in a just-in-time strategy. EUP can be purchased directly from suppliers for delivery to fuel fabricators.[128] This differs from traditional procurement practices, whereby the customer purchases uranium and delivers it first to a converter and then to an enricher. Since the customer does not hold title to the uranium contained in the EUP, the price of EUP includes both the cost of the uranium feed (uranium and conversion segments of the nuclear fuel cycle) suitable for enrichment and the enrichment service. By purchasing EUP, nuclear power plant operators no longer would carry the holding costs involved in owning the uranium through the enrichment stage, which would be transferred to the supplier and included in the price of EUP. The largest suppliers of EUP are expected to be enrichers with access to both competitively priced uranium feed and excess enrichment capacity.

Consolidation in Nuclear Fuel Procurement

A likely outcome of electric power industry restructuring is a consolidation in the ownership of nuclear power generation capacity. Consolidation is expected to take place through mergers, acquisitions, and plant closures. Also, some firms with successful nuclear operating experience will seek to provide operations management and related services to other owners of nuclear power plants. Corresponding to the consolidation in nuclear generating companies will be a decline in the number of buyers of uranium and nuclear fuel cycle services. In addition, individual utilities have developed working partnerships for the purpose of creating the economies of scale required to obtain nuclear fuel and other services at lower cost. One such partnership, the Utilities Service Alliance, was formed by 10 utilities.

Those fuel buyers remaining after industry consolidation are expected to engage in highly efficient procurement practices. They will be positioned to seek price discounts and other advantages from suppliers. Faced with oversupply and declining market prices, suppliers have been offering flexible contracts to utilities for many years. One such flexible contract arrangement offers the option to take delivery of additional quantities of uranium. The decision by a nuclear generating company whether or not to exercise such an option depends on market conditions and the contract price. The option is less likely to be exercised when the spot-market price is lower than the contract price. In this situation, a nuclear generating company could decrease its average cost by purchasing some uranium at a lower price on the spot market.

Consolidation in the Nuclear Fuel Industry

The dramatic decline in uranium prices since the late 1970s (Figure 13) has caused a number of companies to exit the industry. Large oil, metal mining, and nuclear services companies based primarily in the United States have divested significant holdings of uranium assets to concentrate on their core businesses.[129] The buyers generally have been either vertically integrated foreign nuclear fuel cycle companies with foreign government ownership or small domestic uranium mining companies. The consolidation of the uranium industry is continuing, although it is not as intense as it was between about 1985 and 1995.

Recently, the fuel fabrication industry has become the focus of significant consolidation that has been attributed to electric power restructuring. For example, a Siemens executive commented on the joint venture negotiations with British Nuclear Fuels, Ltd. (BNFL), initiated in October 1997, as follows: "These talks are aimed at strengthening the position of both BNFL and Siemens in a competitive market place. The deregulation of the world's electricity markets is increasing the pressure on nuclear power plant operators to reduce their costs and increase plant availability. We want to explore whether a joint venture company will enable us

[127] J. Sellers, "Strategies for Competition and Nuclear Fuel," paper presented at the Nuclear Energy Institutes's FuelCycle 97 conference (Atlanta, GA, April 1997), p. 6.

[128] Energy Information Administration, *World Nuclear Outlook 1995*, DOE/EIA-0436(95) (Washington, DC, October 1995), p. 35.

[129] Energy Information Administration, *Uranium Industry Annual 1993*, "Uranium In Situ Leach Mining in the United States," DOE/EIA-0478(93) (Washington, DC, September 1994), pp. x-xiii.

to better meet our customers' requirements by combining our technological and economic strengths."[130]

Fuel fabrication is less of a commodities business than uranium, conversion, or enrichment. Fabricators are involved in the design, manufacture, installation, and service of fuel assemblies for customers with a variety of reactor designs. With a goal of reducing costs, nuclear power generating companies are looking at fuel management practices, such as extending the time between refueling outages. To meet the needs of their customers' changing fuel management practices, fuel fabricators must develop innovative products and services. Facing the high cost of continuously improving the performance of reactor fuel in a potentially declining market, some companies have chosen to exit the business or seek joint venture partners. The remaining companies have one or more of the following strengths: (1) large market share, (2) manufacturing economies of scale, (3) technological innovation, or (4) overall financial strength.

Conclusion

As the States restructure generation markets over the next few years, utilities that cannot cover the operating costs of their nuclear power plants will be forced either to sell their nuclear units or to retire them prematurely. Nuclear units for which operating costs can be covered—including capital improvement costs—probably will remain in operation, but it is unlikely that all their sunk capital costs can be recovered. The inability of plant owners to cover the plant's full costs, including capital costs, under restructuring, produces "stranded costs."

How the States deal with stranded costs among utility shareholders, creditors, ratepayers, and taxpayers will determine whether nuclear utilities face bankruptcy. The stranded cost recovery issue will not, however, greatly influence whether certain nuclear plants remain in operation. The operational decision will be related primarily to the costs of operating the plant versus the costs of acquiring replacement power on the open market. Issues such as the long-run price of electricity, the supply of surplus capacity, the costs of compliance with Clean Air Act regulations, and the opportunities for greater savings in nuclear O&M costs will determine the outcome of the decision. At this point in time, it seems unlikely that the worst-case scenarios painted by observers of the nuclear energy market will come to pass. Most U.S. nuclear power plants currently are competitive with other sources of electricity, and deregulation probably will not cause them to become less competitive.

Average fuel costs make up just over one-quarter of the electricity generation costs for nuclear power plants. Nevertheless, the competitive environment created by a restructured electric power industry will provide the impetus for nuclear power generating companies to focus on reducing all costs, including fuel. In addition, if early retirements of nuclear power plants are brought about by the economics of electric power restructuring, the demand for nuclear fuel will be reduced. To compete, nuclear fuel suppliers will be forced to reduce prices or provide more efficient, customer-driven services. After enduring a prolonged period of depressed prices, many participants have already exited the nuclear fuel industry. Further consolidation is expected as companies seek to pool resources and spread the risks of operating in a highly competitive environment.

[130] BNFL, "Siemens and BNFL Agree Talks on Nuclear Co-operation," press release (October 15, 1997).

Exhibit E

Exhibit E

Estimated Nuclear Capacity From Enegy Information Administration Reports 1994 - 1998

	Forcast for:				
Source and Year of EIA Study	**2000**	**2005**	**2010**	**2015**	**2020**
World Nuclear Outlook 1994 (Low)	358.8	365.4	354.7		
World Nuclear Outlook 1994 (High)	369.5	386.3	410.3		
International Energy Outlook 1995 (Lower)	356.5	361.8	351.6		
International Energy Outlook 1995 (Upper)	367.1	382.7	403.2		
International Energy Outlook 1996 (Lower)	363.5	361.5	362.8	316.1	
International Energy Outlook 1996 (Upper)	367.1	374.2	391.2	433.5	
Nuclear Power Gen. & Fuel Cycle 1997 (Reference)	**359.6**	**376.6**	**390.5**	**359.6**	
Nuclear Power Gen. & Fuel Cycle 1997 (Low)	343.6	336	326.5	286.7	
Nuclear Power Gen. & Fuel Cycle 1997 (High)	373.2	404.7	432.9	431.9	
Nuclear Power Gen & Fuel Cycle 1998 (Reference)	**351**	**354**	**353**	**332.5**	**302.5**
Nuclear Power Gen. & Fuel Cycle 1998 (Low)	339.8	315	292	232.1	171.7
Nuclear Power Gen. & Fuel Cycle 1998 (High)	357.1	380.3	392.6	406.8	419.7

Source: World Nuclear Outlook 1994, (December 1994), Table 3; International Energy Outlook 1995, (1995), Table 21; International Energy Outlook 1996, (May 1996), Table 18; Nuclear Power Generation and Fuel Cycle Requirements 1997, (Sept 1997), Table 2 and Table F7; Nuclear Power Generation and Fuel Cycle Requirements 1998 (May 1998) Tables 1 - 3.

Table 3. 1993 Operable Nuclear Capacities and Projected Capacities for 1995, 2000, 2005, and 2010
(Net Gigawatts-Electric)

Country	1993[a]	1995		2000		2005		2010	
		Low	High	Low	High	Low	High	Low	High
United States	**99.0**	**100.2**	**100.2**	**102.5**	**102.5**	**103.7**	**103.7**	**90.7**	**94.7**
Canada	**15.8**	**14.9**	**14.9**	**14.1**	**14.1**	**14.1**	**14.1**	**14.1**	**17.4**
Western Europe									
Belgium	5.5	5.5	5.5	5.5	5.5	3.9	3.9	3.9	5.0
Finland	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.8
France	59.0	58.5	59.9	62.9	64.3	65.7	67.2	67.2	68.6
Germany	22.7	22.7	22.7	22.7	22.7	22.7	22.7	20.2	24.5
Italy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Netherlands	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.7
Slovenia	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.6
Spain	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0	9.1
Sweden	10.0	10.0	10.0	10.0	10.0	9.0	10.0	5.9	10.0
Switzerland	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.6	2.6
United Kingdom	11.9	12.9	12.9	11.3	11.3	10.5	10.5	9.5	10.7
Subtotal	**122.7**	**122.3**	**124.4**	**125.0**	**127.1**	**124.4**	**127.5**	**119.0**	**135.8**
Eastern Europe									
Bulgaria	3.5	3.5	3.5	3.5	3.5	2.7	4.5	2.7	5.4
CIS/Armenia	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.7
CIS/Kazakhstan	0.1	0.1	0.1	0.1	0.1	0.1	1.0	0.1	2.0
CIS/Russia	19.8	19.8	20.8	18.9	21.7	17.2	22.5	17.4	20.2
CIS/Ukraine	12.7	12.7	13.6	14.8	15.5	14.8	16.7	14.4	16.7
Czech Republic	1.6	1.6	1.6	3.5	3.5	3.5	3.5	3.5	5.3
Hungary	1.7	1.7	1.7	1.7	1.7	1.7	2.3	1.7	3.5
Lithuania	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Romania	0.0	0.0	0.6	0.6	0.6	1.3	1.3	1.9	2.5
Slovak Republic	1.6	2.0	2.0	2.4	3.2	2.4	3.2	1.6	2.4
Subtotal	**43.5**	**43.9**	**46.4**	**47.9**	**52.6**	**46.4**	**57.7**	**46.0**	**61.2**
Far East									
China	1.2	2.1	2.1	2.1	2.1	2.7	3.3	3.3	5.3
Japan	38.0	39.9	39.9	43.5	43.5	44.1	48.4	50.4	55.2
Korea, North	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.1	0.3
Korea, South	7.2	8.2	8.2	9.1	11.7	13.0	13.0	13.0	16.1
Philippines	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Taiwan	4.9	4.9	4.9	4.9	5.8	6.7	6.7	6.7	8.3
Subtotal	**51.3**	**55.1**	**55.7**	**60.3**	**63.8**	**67.2**	**72.2**	**74.1**	**85.7**
Other									
Argentina	0.9	0.9	0.9	1.6	1.6	1.6	1.6	1.3	1.8
Brazil	0.6	0.6	0.6	1.9	1.9	1.9	1.9	1.9	3.1
Cuba	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.8
India	1.6	1.6	1.8	2.2	2.6	2.5	3.6	3.6	4.4
Mexico	0.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.9
Pakistan	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.4	0.7
South Africa	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.8
Subtotal	**5.8**	**6.4**	**6.6**	**9.0**	**9.4**	**9.6**	**11.1**	**10.8**	**15.5**
Total World	**338.1**	**342.8**	**348.2**	**358.8**	**369.5**	**365.4**	**386.3**	**354.7**	**410.3**

[a]Status as of December 31, 1993.

Note: Totals may not equal sum of components due to independent rounding.

Sources: 1993—**United States**, Nuclear Regulatory Commission, "Information Digest, 1994 Edition" (NUREG-0380) (May 1994); **Foreign**, International Atomic Energy Agency (IAEA), "Nuclear Power Reactors in the World" (Vienna, Austria, April 1994). **Projections**—Energy Information Administration, "World Integrated Nuclear Evaluation System" (WINES April 1994 run). The remaining projections are based on a critical assessment of detailed country-specific nuclear power plans. Information used in developing the projections for the countries of Eastern Europe, the People's Republic of China, Cuba, and North Korea was obtained from the International Atomic Energy Agency's 1994 Consultancy Meeting on International Nuclear Capacity Forecasting.

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International Energy Outlook, 1995
Energy Information Administration, U.S. Department of Energy
Contact: Linda Doman, (202) 586-1041

File Last Updated: July 6, 1995
http://www.eia.doe.gov/oiaf/ieo95/tbls.html

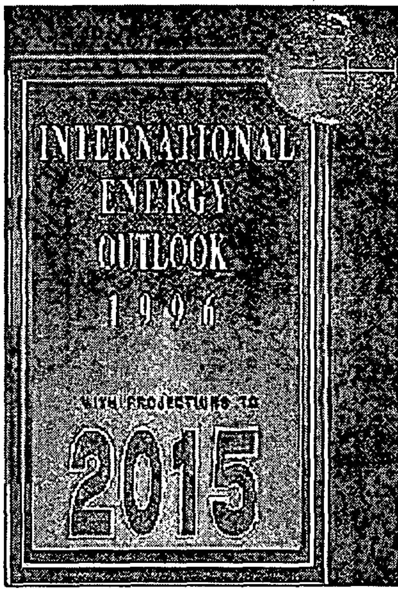
Table 21. Historical and Projected Operable Nuclear Capacities
(Net Gigawatts)

Country	1993(a)	1995 Lower Ref. Case	1995 Upper Ref. Case	2000 Lower Ref. Case	2000 Upper Ref. Case	2005 Lower Ref. Case	2005 Upper Ref. Case	201 Lower Ref. Case
OECD	275.5	277.5	278.9	284.1	285.5	284.0	290.7	272.4
United States	99.0	99.0	99.0	100.1	100.1	100.1	100.1	87.6
Canada	15.8	14.9	14.9	14.1	14.1	14.1	14.1	14.1
Mexico	0.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Japan	38.0	39.9	39.9	43.5	43.5	44.1	48.4	50.4
Western Europe								
Belgium	5.5	5.5	5.5	5.5	5.5	3.9	3.9	3.9
Finland	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
France	59.0	58.5	59.9	62.9	64.3	65.7	67.2	67.2
Germany	22.7	22.7	22.7	22.7	22.7	22.7	22.7	20.2
Italy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
Spain	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Sweden	10.0	10.0	10.0	10.0	10.0	9.0	10.0	5.9
Switzerland	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.6
United Kingdom	11.9	12.9	12.9	11.3	11.3	10.5	10.5	9.5
EE/FSU	44.1	43.9	47.0	47.9	53.2	46.4	58.4	46.0
Eastern Europe								
Bulgaria	3.5	3.5	3.5	3.5	3.5	2.7	4.5	2.7
Czech Republic	1.6	1.6	1.6	3.5	3.5	3.5	3.5	3.5
Slovak Republic	1.6	2.0	2.0	2.4	3.2	2.4	3.2	1.6
Hungary	1.7	1.7	1.7	1.7	1.7	1.7	2.3	1.7
Romania	0.0	0.0	0.6	0.6	0.6	1.3	1.3	1.9
Slovenia	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0
Former Soviet Union								
Russia	19.8	19.8	20.8	18.9	21.7	17.2	22.5	17.4
Ukraine	12.7	12.7	13.6	14.8	15.5	14.8	16.7	14.4
Armenia	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4
Kazakhstan	0.1	0.1	0.1	0.1	0.1	0.1	1.0	0.1
Lithuania	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Non-OECD	18.4	20.3	21.1	24.4	28.3	31.4	33.6	33.1
Asia								
China	1.2	2.1	2.1	2.1	2.1	2.7	3.3	3.3
India	1.6	1.6	1.8	2.2	2.6	2.5	3.6	3.6
Korea, South	7.2	8.2	8.2	9.1	11.7	13.0	13.0	13.0
Korea, North	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.1
Pakistan	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.4
Philippines	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6
Taiwan	4.9	4.9	4.9	4.9	5.8	6.7	6.7	6.7
Central and South America								
Argentina	0.9	0.9	0.9	1.6	1.6	1.6	1.6	1.3
Brazil	0.6	0.6	0.6	1.9	1.9	1.9	1.9	1.9
Cuba	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4
South Africa	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total World	338.1	341.6	347.1	356.5	367.1	361.8	382.7	351.6

(a) Status as of December 31, 1993.

Notes: OECD = Organization for Economic Cooperation and Development. EE/FSU = Eastern Europe/Former Soviet Union. Totals may not equal sum of components due to independent rounding. The Lower and Upper Reference Cases reflect varying degrees o optimism regarding nuclear power.

Sources: United States: Energy Information Administration, Annual Energy Outlook 1995, DOE/EIA-0383(95) (Washington, DC, January 1995), updated by staff projections Office of Integrated Analysis and Forecasting, based on new information about units under construction (March 1995). Foreign: Energy Information Administration, World Nuclear Outlook 1994, DOE/EIA-0436(94) (Washington, DC, December 1994).



Highlights
World Energy Consumption
The World Oil Market
Natural Gas
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Nuclear Power
Hydroelectric and Other Renewable Energy
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Appendix A: World Energy Consumption, Oil Production, and Carbon Emissions Tables
Appendix B: World Energy Production System
Information

Preface

This International Energy Outlook presents historical data from 1970 to 1993 and EIA's projections of energy consumption and carbon emissions through 2015 for six country groups. Prospects for individual fuels are discussed.

The *International Energy Outlook 1996 (IEO96)* presents an assessment by the Energy Information Administra tion (EIA) of the outlook for international energy markets through 2015. The report is an extension of the EIA's *Annual Energy Outlook 1996* (*AEO96*), which was prepared using the National Energy Modeling System (NEMS). U.S. projections appearing in the *IEO96* are consistent with those published in the *AEO96*. *IEO96* is provided as a statistical service to energy managers and analysts, both in government and in the private sector. The projections are used by international agencies, Federal and State governments, trade associations, and other planners and decisionmakers. They are published pursuant to the Department of Energy Organization Act of 1977 (Public Law 95-91), Section 205(c). The *IEO96* projections are based on U.S. and foreign government policies in effect on October 1, 1995.

Projections in *IEO96* are displayed according to six basic country groupings (Figure 1). In addition, the Organization for Economic Cooperation and Development (OECD) includes projections for four individual countries--the United States, Canada, Mexico, and Japan--along with the subgroups OECD Europe and Other OECD (defined as Australia, New Zealand, and the U.S. Territories). The non-OECD countries are represented by five separate regional subgroups: Eastern Europe and the former Soviet Union (EE/FSU), non-OECD Asia, Africa, Middle East, and Central and South America. China and India are represented in non-OECD Asia. The detailed projections for India are new to this year's report.

Nuclear Power

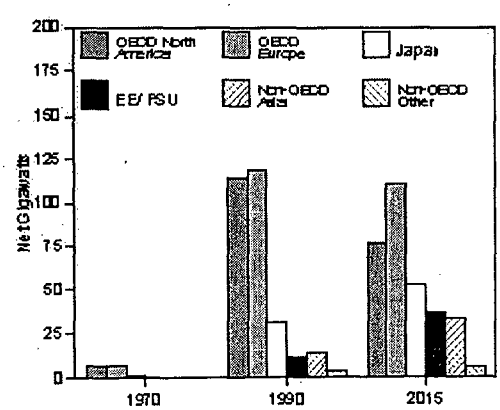
Growth in nuclear capacity is expected in France, in Japan, and in developing nations just beginning their nuclear power programs. In other nations with nuclear capacity, declines are anticipated.

World Trends | Regional Overview

Nuclear power plants have been generating electricity since the 1960s. In recent years, countries with nuclear power programs have derived an average of more than 20 percent of total electricity generation from nuclear fuels; however, fewer than half of those countries are projected to experience net growth in nuclear capacity between 1994 and 2015 in the lower reference case (as defined below). Growth is expected mainly in developing countries just beginning their nuclear programs, and in France and Japan (Figure 51). In the United States, nuclear power capacity is projected to decline by one-third, given the assumption that existing plants will be retired at the end of their licensed operating lives. In Europe, only France is expected to achieve further growth in nuclear generating capacity. Despite rapid growth in nuclear capacity in Asia, overall reliance on nuclear energy is projected to decline by 2015.

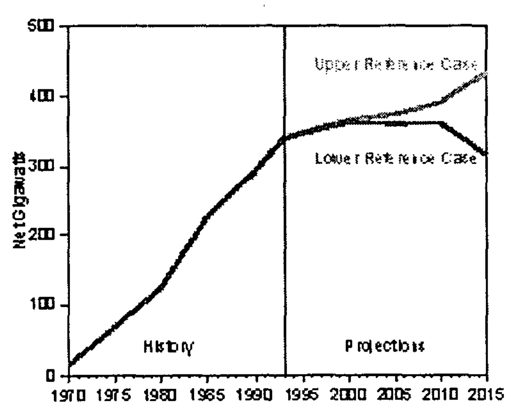
Two scenarios were developed for projections of nuclear capacity in this report (Figure 52). The *lower reference case* reflects a continuation of the present trends in the nuclear power industry, resulting in minimal growth through 2010 and a decline by 2015, as discussed above. The *upper reference case* reflects a moderate revival in nuclear orders, with net capacity growth of 1.1 percent per year over the forecast period. In the upper reference case, net increases in nuclear capacity are projected for all but 7 of the 39 countries with nuclear programs (Table 18).

Figure 51. World Nuclear Capacity by Region, 1970, 1990, and 2015



Sources: **History:** International Atomic Energy Agency, *Nuclear Power Reactors in the World* (Vienna, Austria, April 1993). **Projections:** Energy Information Administration, *World Nuclear Outlook 1995* DOE/EIA-0436(95) (Washington, DC, October 1995), p. 8.

Figure 52. World Nuclear Capacity, 1970-2015



Sources: **History:** International Atomic Energy Agency, *Nuclear Power Reactors in the World* (Vienna, Austria, April 1993). **Projections:** Energy Information Administration, *World Nuclear Outlook 1995* DOE/EIA-0436(95) (Washington, DC, October 1995), p. 8.

Table 18. Historical and Projected Operable Nuclear Capacities, 1994-2015
(Net Gigawatts)

Country	1994[a]	2000		2005		2010		2015	
		Lower Reference Case	Upper Reference Case	Lower Reference Case	Upper Reference Case	Lower Reference Case	Upper Reference Case	Lower Reference Case	Upper Reference Case
OECD	**276.4**	**285.7**	**285.9**	**281.8**	**283.9**	**277.1**	**288.3**	**239.7**	**317.4**
United States	99.1	100.3	100.3	99.7	100.3	93.3	100.3	63.6	99.6
Canada	15.8	14.1	14.1	14.1	14.1	12.0	12.0	12.0	15.3
Mexico	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.9
Japan	38.9	43.7	43.7	45.8	46.1	51.1	52.3	52.6	57.7
Western Europe									
Belgium	5.5	5.5	5.5	4.7	4.7	3.9	3.9	3.9	4.8
Finland	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.7
France	58.5	64.3	64.3	62.9	62.9	62.9	64.3	60.5	72.8
Germany	22.7	22.0	22.0	21.4	21.4	21.4	21.4	20.2	23.6
Italy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Netherlands	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.4
Spain	7.1	7.0	7.1	7.0	7.0	6.5	7.0	6.5	9.4
Sweden	10.0	10.0	10.0	10.0	10.0	10.0	10.0	6.7	10.5
Switzerland	3.0	3.0	3.0	2.3	2.3	1.9	1.9	1.9	2.6
Turkey	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	2.0
United Kingdom	11.7	11.8	11.8	10.5	10.5	9.5	10.7	7.2	12.4
EE/FSU	**44.1**	**51.8**	**52.8**	**47.6**	**61.8**	**45.9**	**59.2**	**36.8**	**62.7**
Eastern Europe									
Bulgaria	3.5	2.7	2.7	1.9	2.9	1.9	3.8	1.9	3.8
Czech Republic	1.6	2.6	3.5	3.5	3.5	3.5	3.5	3.1	5.1
Hungary	1.7	1.7	1.7	1.7	1.7	1.7	2.3	2.1	3.3
Romania	0.0	0.6	1.3	1.3	1.9	1.9	2.5	2.5	3.2
Slovak Republic	1.6	1.6	2.0	1.6	1.6	1.6	1.6	0.8	1.4
Slovenia	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Former Soviet Union									
Armenia	0.0	0.4	0.7	0.4	0.7	0.4	0.7	0.4	0.7
Kazakhstan	0.1	0.1	0.1	0.0	0.6	0.1	0.6	0.0	1.2
Lithuania	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Russia	19.8	23.6	23.6	20.1	20.9	17.5	24.5	12.9	27.1
Ukraine	12.7	15.5	14.1	14.1	15.1	15.6	16.6	11.4	15.2
Non-OECD	**20.2**	**26.0**	**28.4**	**32.1**	**38.5**	**39.7**	**43.8**	**39.6**	**53.4**
Asia									
China	2.1	2.1	2.1	3.3	5.3	5.3	5.3	5.3	8.2
India	1.5	2.3	2.5	2.2	3.6	3.3	3.5	3.3	5.1
Korea, North	0.0	0.2	0.2	0.2	1.9	0.2	1.9	0.2	1.9
Korea, South	8.2	13.0	13.0	13.9	14.9	17.4	17.4	17.4	19.3
Pakistan	0.1	0.1	0.4	0.4	0.4	0.4	0.7	0.3	0.6
Philippines	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.6
Taiwan	4.9	4.9	4.9	6.7	6.7	6.7	6.7	6.7	8.5
Central and South America									
Argentina	0.9	0.9	1.6	1.6	1.6	1.3	1.3	1.3	1.5
Brazil	0.6	0.6	1.9	1.9	1.9	1.9	3.1	1.9	3.1
Cuba	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.8
Middle East									
Iran	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.3
Israel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
South Africa	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total World	**340.7**	**363.5**	**367.1**	**361.5**	**374.2**	**362.8**	**391.2**	**316.1**	**433.5**

[a]Status as of December 31, 1994.

Notes: OECD = Organization for Economic Cooperation and Development. EE/FSU = Eastern Europe/Former Soviet Union. Totals may not equal sum of components due to independent rounding. The lower and upper reference cases reflect varying degrees of optimism regarding nuclear power.

Sources: **United States:** Energy Information Administration, *Annual Energy Outlook 1996* DOE/EIA-0383(96) (Washington, DC, January 1996). **Foreign:** Energy Information Administration, *World Nuclear Outlook 1995* DOE/EIA-0436(95) (Washington, DC, October 1995).

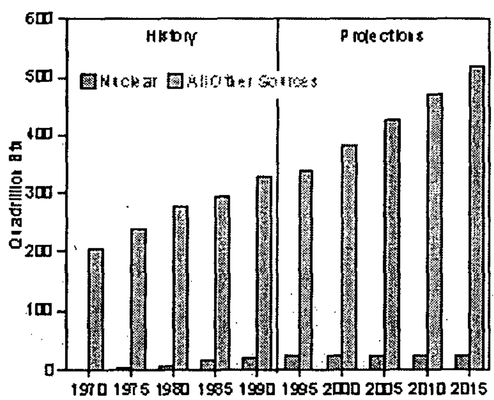
World Trends

The performance of nuclear reactors has been improving worldwide. A review of 1994 performance. as measured by reactor load factors, (The annual load factor is calculated as the gross generation of a reactor in a 1-year period, divided by the gross capacity of the reactor, as originally designed. multiplied by the number of hours in the calendar year.) indicates that 55 percent of all reactors achieved load factors above 75 percent, whereas only 48 percent were above the 75-percent level in

1993 [1]. Moreover, 54 reactors in various countries achieved load factors above 90 percent for the year. The highest national averages--all above 80 percent--were reported by Switzerland, Argentina, Finland, Hungary, South Korea, Netherlands, Czech Republic, and Belgium. All of these countries, except Argentina and the Netherlands, operate four or more reactors.

Improvements in reactor performance have been made possible, in large part, by longer operating cycles and shorter refueling times. For example, the longest continuous run ever achieved for a light-water reactor--616 days at Indian Point 2 in the United States--was completed in 1994, and two impressively short refueling outages were recorded during the year--35.5 days at Peach Bottom 2 and 31 days at North Anna 1, both in the United States.

Figure 53. World Consumption of Electricity From Nuclear Power Relative to All Other Fuels, 1970-2015



Sources: **History:** 1970-1975: Energy Information Administration (EIA), Office of Energy Markets and End Use, International Statistics Database. 1980-1990: EIA, *International Energy Annual 1993* DOE/EIA-0219(93) (Washington, DC, May 1995). **Projections:** EIA, World Energy Projection System (1996).

The world's net operable nuclear capacity at the end of 1994 was 341 gigawatts for 432 reactors [2]. Total electricity generation from nuclear power increased slightly in 1994, with production of 2,131 net terawatthours worldwide. The United States, France, Germany, Russia, Ukraine, and Japan accounted for more than 70 percent of the total. Total nuclear generation, which grew substantially between 1980 and 1990, is projected to remain nearly level through 2015 (Figure 53). As increased emphasis on competition in electricity markets causes providers to turn to generating sources with short construction leadtimes and low capital costs, nuclear power will be at a severe disadvantage because of the higher construction costs and longer leadtimes for new nuclear capacity. In most areas of the world, currently operating nuclear plants will have to demonstrate improved performance and lower operating costs to prove that investments in nuclear power can be competitive.

Regional Overview

Non-OECD Asia

Countries in non-OECD Asia currently operating nuclear power plants include China, South Korea, Taiwan, India, and Pakistan. With the exception of South Korea, these programs are small, but all expect growth in the future. At the end of 1994, these five countries had 16.8 gigawatts of nuclear capacity on line. By 2015, additional programs are expected to be operating in the Philippines and North Korea, and nuclear capacity for the region is projected to be between 33.2 and 44.2 gigawatts. South Korea, currently the largest operator of nuclear power in the region, with 10 operable units totaling 8.2 gigawatts, projects a doubling of capacity to between 17.4 and 19.3 gigawatts by 2015.

During 1994 two new units became operable in the region: Guangdong 2, a 906-megawatt pressurized-water reactor (PWR) in China, and Yonggwang 3, a 950-megawatt PWR in South Korea. At the end of 1994, 27 units were under construction or on order in non-OECD Asian countries, including 11 in South Korea [2, p. 6]. South Korea has experienced rapid growth in energy demand over the past 20 years but still lags behind Japan and Taiwan in per capita electricity consumption. Therefore, its potential for continued growth is high. The latest power development plan for South Korea calls for 35 percent of new generating capacity over the next 10 years to come from nuclear power. China has also announced aggressive plans to build additional nuclear power plants to meet

Table 2. 1996 Operable Nuclear Capacities and Projected Reference Case Capacities for 2000, 2005, 2010, and 2015
(Megawatts-electric)

Country Name	1996[a]	2000	2005	2010	2015	Growth Rate (1996-2005)	Growth Rate (2005-2010)	Growth Rate (2010-2015)
North America								
United States	[b]100,685	99,382	94,965	89,122	62,960	-0.6	-1.3	-6.7
Canada	14,902	14,054	14,054	14,054	11,994	-0.6	0.0	-3.1
Subtotal	**115,587**	**113,436**	**109,019**	**103,176**	**74,954**	**-0.6**	**-1.1**	**-6.2**
W. Europe								
Belgium	5,712	5,712	5,712	5,712	5,712	0.0	0.0	0.0
Finland	2,355	2,610	2,610	2,610	2,610	1.1	0.0	0.0
France	59,948	64,303	62,870	62,870	62,870	0.5	0.0	0.0
Germany	22,282	21,063	21,063	20,723	18,916	-0.6	-0.3	-1.8
Netherlands	504	449	0	0	0	N/A	N/A	N/A
Slovenia	632	632	632	632	632	0.0	0.0	0.0
Spain	7,207	7,207	7,054	7,054	7,054	-0.2	0.0	0.0
Sweden	10,040	10,040	10,040	10,040	6,685	0.0	0.0	-7.8
Switzerland	3,077	3,077	3,077	2,712	2,000	0.0	-2.5	-5.9
United Kingdom	12,928	11,772	10,518	9,568	7,158	-2.3	-1.9	-5.6
Subtotal	**124,685**	**126,865**	**123,576**	**121,921**	**113,637**	**-0.1**	**-0.3**	**-1.4**
E. Europe								
Armenia	376	376	752	752	752	8.0	0.0	0.0
Bulgaria	3,538	3,538	2,722	2,722	1,906	-2.9	0.0	-6.9
Czech Republic	1,648	3,472	3,472	3,472	3,472	8.6	0.0	0.0
Hungary	1,729	1,729	1,729	1,729	1,729	0.0	0.0	0.0
Kazakhstan	70	70	500	500	500	24.4	0.0	0.0
Lithuania	2,370	2,370	2,370	2,370	1,185	0.0	0.0	-12.9
Romania	650	650	1,300	1,300	1,300	8.0	0.0	0.0
Russia	19,843	19,843	23,618	22,758	18,347	2.0	-0.7	-4.2
Slovak Republic	1,632	2,020	1,592	1,592	1,592	-0.3	0.0	0.0
Ukraine	13,765	14,015	13,090	15,577	11,400	-0.6	3.5	-6.1
Subtotal	**45,621**	**48,083**	**51,145**	**52,772**	**42,183**	**1.3**	**0.6**	**-4.4**
Far East								
China	2,167	2,167	6,737	11,542	17,500	13.4	11.4	8.7
Japan	42,369	43,525	50,176	54,768	59,200	1.9	1.8	1.6
Korea, North	0	0	950	1,900	1,900	N/A	14.9	0.0
Korea, South	9,120	12,990	16,790	20,600	24,600	7.0	4.2	3.6
Taiwan	4,884	4,884	7,384	7,384	7,384	4.7	0.0	0.0
Subtotal	**58,540**	**63,566**	**82,037**	**96,194**	**110,584**	**3.8**	**3.2**	**2.8**
Other								
Argentina	935	935	1,627	1,292	1,292	6.3	-4.5	0.0
Brazil	626	626	1,871	1,871	1,871	12.9	0.0	0.0
India	1,695	2,503	2,653	5,913	7,900	5.1	17.4	6.0
Iran	0	0	1,073	2,146	2,146	N/A	14.9	0.0
Mexico	1,308	1,308	1,308	1,308	1,308	0.0	0.0	0.0
Pakistan	125	425	425	725	600	14.6	11.3	-3.7
South Africa	1,842	1,842	1,842	1,842	1,842	0.0	0.0	0.0
Turkey	0	0	0	1,300	1,300	N/A	N/A	0.0
Subtotal	**6,531**	**7,639**	**10,799**	**16,397**	**18,259**	**5.7**	**8.7**	**2.2**
Total World	350,964	359,589	376,576	390,460	359,617	0.3	0.7	-1.6

[a]Status as of December 31, 1996.
[b]1996 U.S. capacity is preliminary.

Table F7. Low and High Case Nuclear Capacity Projections for 2000, 2005, 2010, and 2015
(Net Gigawatts Electric)

Country Name	Low Case				High Case			
	2000	2005	2010	2015	2000	2005	2010	2015
North America								
United States	89.1	63.0	49.1	22.1	101.0	101.0	99.4	95.0
Canada	14.1	13.7	13.6	11.5	15.0	14.7	14.8	13.1
Subtotal	103.2	76.7	62.7	33.6	116.0	115.7	114.2	108.1
W. Europe								
Belgium	5.6	5.5	5.5	5.4	5.8	5.9	6.0	6.0
Finland	2.6	2.5	2.5	2.5	2.7	2.7	2.7	2.8
France	63.2	61.0	60.2	59.5	65.5	65.0	65.8	66.6
Germany	20.7	20.4	19.9	17.9	21.5	21.8	21.7	20.0
Netherlands	0.4	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Slovenia	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.8
Spain	7.1	6.8	6.8	6.7	7.3	7.3	7.4	7.5
Sweden	9.9	9.7	9.6	6.3	10.2	10.4	10.5	7.1
Switzerland	3.0	3.0	2.6	1.9	3.1	3.2	2.8	2.1
United Kingdom	11.6	10.2	9.2	6.8	12.0	10.9	10.0	7.6
Subtotal	124.7	120.0	116.8	107.5	129.4	127.9	127.7	120.5
E. Europe								
Armenia	0.4	0.8	0.7	0.7	0.4	0.9	1.0	1.0
Bulgaria	3.4	2.7	2.5	1.7	3.9	3.3	3.4	2.5
Czech Republic	3.4	3.5	3.2	3.1	3.9	4.1	4.3	4.6
Hungary	1.7	1.7	1.6	1.5	1.9	2.1	2.2	2.3
Kazakhstan	0.1	0.5	0.5	0.5	0.1	0.6	0.6	0.7
Lithuania	2.4	2.4	2.2	1.1	2.7	2.8	3.0	1.6
Romania	0.6	1.3	1.2	1.2	0.7	1.6	1.6	1.7
Russia	19.9	23.6	21.4	16.8	22.3	28.3	29.0	25.0
Slovak Republic	2.0	1.6	1.5	1.4	2.3	1.9	2.0	2.1
Ukraine	14.1	13.1	14.6	10.4	15.7	15.7	19.9	15.5
Subtotal	47.9	51.1	49.3	38.3	53.9	61.3	67.0	57.2
Far East								
China	1.9	5.6	8.4	11.7	2.2	7.3	12.4	19.8
Japan	41.9	47.5	51.2	54.7	44.0	51.4	56.9	62.4
Korea, North	0.0	1.0	1.6	1.5	0.0	1.1	2.3	2.4
Korea, South	12.3	16.8	17.0	19.1	14.3	19.4	24.6	30.4
Taiwan	4.6	7.4	6.1	5.7	5.4	8.6	8.8	9.1
Subtotal	60.7	78.2	84.3	92.7	65.8	87.8	105.0	124.1
Other								
Argentina	0.8	1.6	1.0	0.9	1.0	1.9	1.5	1.6
Brazil	0.6	1.9	1.4	1.3	0.7	2.2	2.2	2.3
India	2.3	2.3	4.7	6.1	2.7	3.0	7.1	9.7
Iran	0.0	0.9	1.7	1.7	0.0	1.1	2.4	2.6
Mexico	1.3	1.3	1.3	1.3	1.3	1.3	1.5	1.5
Pakistan	0.4	0.4	0.6	0.5	0.5	0.5	0.9	0.7
South Africa	1.7	1.7	1.5	1.5	1.8	2.0	2.0	2.2
Turkey	0.0	0.0	1.2	1.2	0.0	0.0	1.4	1.4
Subtotal	7.0	10.0	13.5	14.5	8.1	12.0	18.9	22.0
Total World	343.6	336.0	326.5	286.7	373.2	404.7	432.9	431.9

Notes: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels, Supply Analysis Division.

Energy Information Administration

Nuclear Power Generation and Fuel Cycle Requirements 1998

May 1998

The publication, *Nuclear Power Generation and Fuel Cycle Report* will not be printed in 1998. This website provides information and forecasts on the U.S. and world nuclear and uranium industries. The nuclear capacity projections are consistent with those in the *International Energy Outlook 1998* and the *Annual Energy Outlook 1998*. Also, the nuclear capacity and fuel cycle projections are given through 2020. Fuel cycle projections were developed using the PC version of the International Nuclear Model. The nuclear capacity projections were derived by estimating the completion dates for nuclear units under construction and planned in each country, by incorporating the capacity upgrades, and by scheduled retirements of currently operating units. In addition, the estimated dates for unit completion are based on an analysis of historical construction performance, regulatory issues, financial constraints, and regional electricity demand.

The legislation that created the EIA vested the organization with an element of statutory independence. The EIA does not take positions on policy questions. Its responsibilities are to provide timely, high-quality information and to perform objective, credible analyses in support of deliberations by both public and private decision makers. Accordingly, these projections do not purport to represent a policy position of the U.S. Department of Energy or the Administration. As part of the EIA program to provide energy information, this file provides information and forecasts important to the domestic and world nuclear

Table 1. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, Reference Case

Table 2. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, High Case

Table 3. 1996 Operable Nuclear Capacities and Projected Capacities for 2000-2020, Low Case

Table 4. Projected World Annual Uranium Requirements, 1998-2020

Table 5. Projected World Annual Uranium Enrichment Service Requirements, 1998 - 2020

Table 6. Projected World Annual Spent Fuel Discharges, 1998-2020

Table 7. Projected World Cumulative Uranium Requirements, 1998-2020

Table 8. Projected World Cumulative Uranium Enrichment Service Requirements, 1998 - 2020

Table 9. Projected World Cumulative Spent Fuel Discharges, 1998-2020

Appendix A. Nuclear Power Technology and the Nuclear Fuel Cycle

Appendix B. The Analysis Systems

Appendix C. Projections for Nuclear Generating Units, Reference Case, 1998 through 2020

Appendix D. U.S. Customary Units

important to the domestic and world nuclear and uranium industries.

Aadditional data will be added to this site as it is developed.

of Measurement, International System of Units (SI), and Selected Data Tables, in SI Metric Units

Glossary

Contacts

This was prepared in the Coal and Electric Data and Renewables Division, Office of Coal, Nuclear, Electric, and Alternate Fuels. Technical information regarding this report may be obtained from Dr. Z.D. (Dan) Nikodem zdenek.nikodem@eia.doe.gov , or (202) 426-1179.

For additional nuclear information in HTML format

EIA Interactive Data Query
Short Term Energy Outlook
Uranium Industry Annual 1997
Nuclear Power Generation and Fuel Cycle Report 1997
Spent Nuclear Fuel Discharged from U.S. Reactors 1994 (PDF)

File last modified: May 1998

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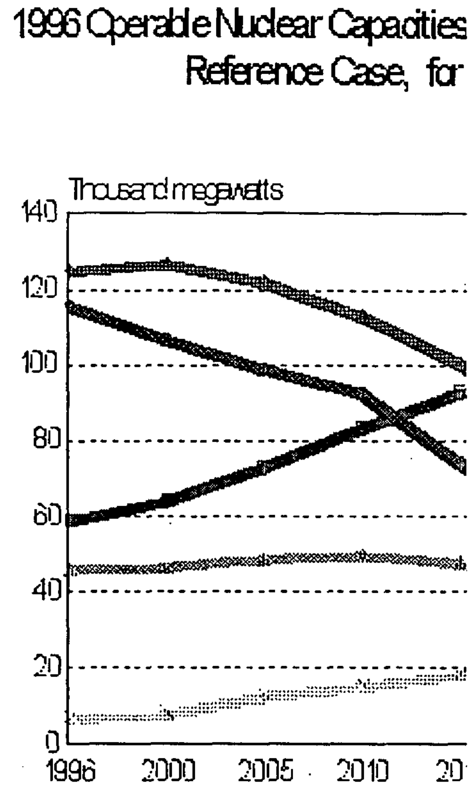
Table 1. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, Reference Case
(Megawatts)

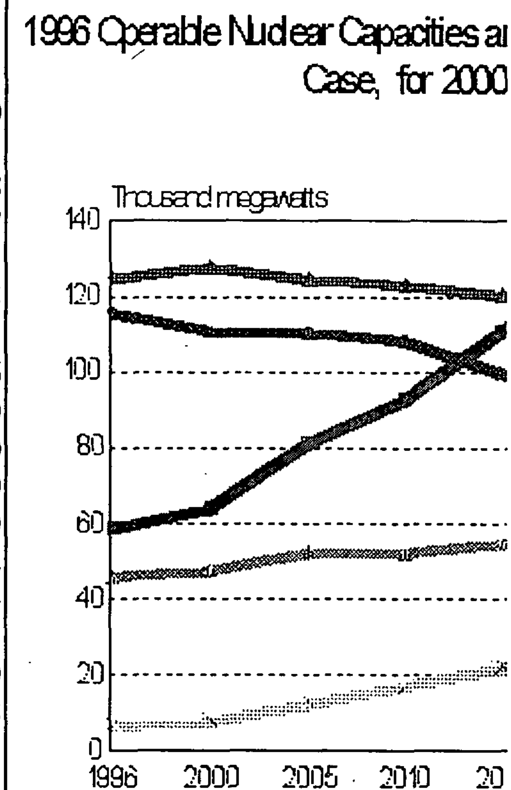
COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	11146	11994	11994	10298	8631
UNITED STATES	100817	95605	86800	80357	63881	49217
Subtotal	115719	106751	98794	92351	74179	57848
Western Europe						
BELGIUM	5712	5712	5712	3966	3966	1015
FINLAND	2355	2610	2610	2610	0	0
FRANCE	59948	64303	62870	62870	62870	62950
GERMANY	22282	21063	20083	16120	11800	5250
NETHERLANDS	504	449	449	0	0	0
SLOVENIA	632	632	632	632	632	0
SPAIN	7207	7207	7054	6614	6614	3842
SWEDEN	10040	10040	9440	8840	6085	4148
SWITZERLAND	3077	3077	2712	2000	1030	1030
UNITED KINGDOM	12928	11772	10518	9568	7158	7158
Subtotal	124685	126865	122080	113220	100155	85393
Eastern Europe						
ARMENIA	376	376	752	752	752	752
BULGARIA	3538	3538	2722	2722	1906	1906
CZECH REPUBLIC	1648	2560	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1729	866
KAZAKHSTAN	70	70	570	500	500	500
LITHUANIA	2370	2370	2370	2370	2370	1185
ROMANIA	650	650	1300	1300	1300	1300
RUSSIA	19843	19843	20785	19832	18350	21980
SLOVAK REPUBLIC	1632	2020	1592	1592	1592	1592
UKRAINE	13765	13065	13090	14990	15577	11400
Subtotal	45621	46221	48382	49259	47548	44953
Far East						
CHINA	2167	2167	6737	11542	14700	18760
JAPAN	42369	43525	44321	47526	53623	54107
NORTH KOREA	0	0	950	1900	1900	1900
SOUTH KOREA	9120	12990	12990	14890	16234	15000
TAIWAN	4884	4884	7384	7384	6176	4280
Subtotal	58540	63566	72382	83242	92633	94047
Other						
ARGENTINA	935	935	1627	1292	1292	1292
BRAZIL	626	626	1871	1871	1871	1871
INDIA	1695	2503	3103	5913	7640	9890



IRAN	0	0	2146	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	1308
PAKISTAN	125	425	425	600	600	600
SOUTH AFRICA	1842	1842	1842	1842	1842	1842
TURKEY	0	0	0	0	1300	1300
Subtotal	6531	7639	12322	14972	17999	20249
World Total	351096	351042	353960	353044	332514	302490

Table 2. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, High Case
(Megawatts)

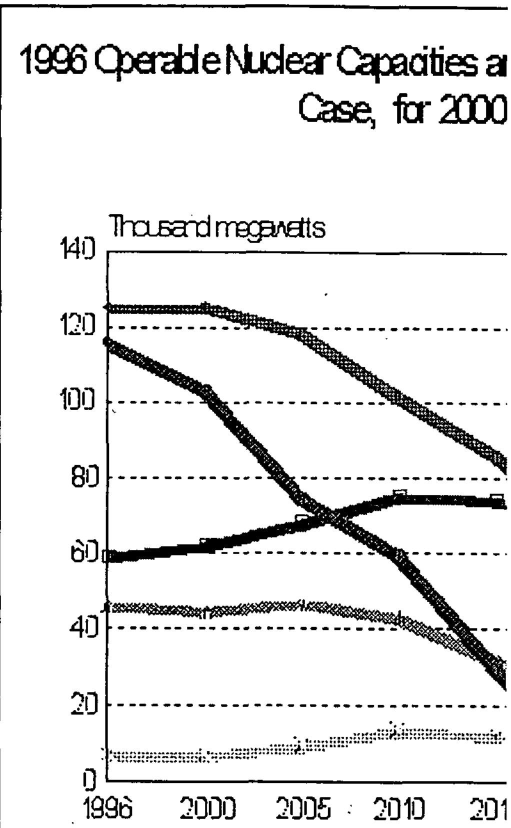
COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	13024	14902	14902	12842	10298
UNITED STATES	100817	97635	95555	93525	86800	80357
Subtotal	115719	110659	110457	108427	99642	90655
Western Europe						
BELGIUM	5712	5712	5712	5712	5320	3966
FINLAND	2355	2610	2610	2610	2610	0
FRANCE	59948	64303	62870	64320	70400	76500
GERMANY	22282	21063	20723	20083	14835	10540
NETHERLANDS	504	449	449	449	0	0
SLOVENIA	632	632	632	632	632	632
SPAIN	7207	7207	7207	7054	6614	6614
SWEDEN	10040	10040	10040	10040	10040	6685
SWITZERLAND	3077	3077	3077	2712	2355	2000
UNITED KINGDOM	12928	12682	11035	9568	7768	7158
Subtotal	124685	127775	124355	123180	120574	114095
Eastern Europe						
ARMENIA	376	752	752	752	752	752
BULGARIA	3538	3538	2722	2722	2859	3812
CZECH REPUBLIC	1648	3472	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1729	1729
KAZAKHSTAN	70	70	570	570	500	500
LITHUANIA	2370	2370	2370	2370	2370	2370
ROMANIA	650	650	1300	1950	1950	1950
RUSSIA	19843	19843	22668	20785	23590	26360
SLOVAK REPUBLIC	1632	2020	2408	1592	1592	1592
UKRAINE	13765	13065	14040	15940	15940	15577
Subtotal	45621	47509	52031	51882	54754	58114
Far East						
CHINA	2167	2167	6737	11542	17160	25070
JAPAN	42369	43525	50176	54768	61870	69260
NORTH KOREA	0	0	1900	1900	1900	1900
SOUTH KOREA	9120	12990	14890	16790	21957	27987
TAIWAN	4884	4884	7384	7384	7384	6176
Subtotal	58540	63566	81087	92384	110271	130393
Other						
ARGENTINA	935	935	1627	1292	1292	1292
BRAZIL	626	626	1871	1871	3100	3100
CUBA	0	0	0	408	816	816



INDIA	1695	2503	3103	5913	9180	14000
IRAN	0	0	2146	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	1308
PAKISTAN	125	425	425	600	600	600
SOUTH AFRICA	1842	1842	1842	1842	1842	1842
TURKEY	0	0	0	1300	1300	1300
Subtotal	6531	7639	12322	16680	21584	26404
World Total	351096	357148	380252	392553	406825	419661

Table 3. 1996 Operable Nuclear Capacities and Projected Capacities for 2000 to 2020, Low Case
(Megawatts)

COUNTRY	1996	2000	2005	2010	2015	2020
North America						
CANADA	14902	10298	10298	10298	7136	2643
UNITED STATES	100817	92653	63881	49217	22154	2320
Subtotal	115719	102951	74179	59515	29290	4963
Western Europe						
BELGIUM	5712	5712	5712	3966	2000	0
FINLAND	2355	2355	2355	1155	0	0
FRANCE	59948	64070	62870	62870	62870	56190
GERMANY	22282	20723	18916	13075	7896	1269
NETHERLANDS	504	449	0	0	0	0
SLOVENIA	632	632	632	632	0	0
SPAIN	7207	7054	6614	6614	4797	1906
SWEDEN	10040	9440	8395	4202	0	0
SWITZERLAND	3077	3077	2000	2000	1030	0
UNITED KINGDOM	12928	11352	10518	7158	7158	5908
Subtotal	124685	124864	118012	101672	85751	65273
Eastern Europe						
ARMENIA	376	376	376	0	0	0
BULGARIA	3538	3538	2722	1906	953	0
CZECH REPUBLIC	1648	1648	3472	3472	3472	3472
HUNGARY	1729	1729	1729	1729	1299	0
KAZAKHSTAN	70	70	0	500	500	500
LITHUANIA	2370	2370	2370	1185	1185	0
ROMANIA	650	650	650	1300	1300	1300
RUSSIA	19843	19843	20132	17397	10050	6275
SLOVAK REPUBLIC	1632	1632	1592	1592	1592	1592
UKRAINE	13765	12140	13090	13677	11400	7600
Subtotal	45621	43996	46133	42758	31751	20739
Far East						
CHINA	2167	2167	6737	11542	11542	11542
JAPAN	42369	43525	43525	43525	43205	42864
NORTH KOREA	0	0	0	950	950	950
SOUTH KOREA	9120	10730	12340	12340	13684	11939
TAIWAN	4884	4884	4884	6176	4280	2500
Subtotal	58540	61306	67486	74533	73661	69795
Other						
ARGENTINA	935	935	935	1292	1292	1292
BRAZIL	626	626	626	1871	1871	1871
INDIA	1695	1799	3103	4726	4416	4416



IRAN	0	0	1073	2146	2146	2146
MEXICO	1308	1308	1308	1308	1308	654
PAKISTAN	125	125	300	300	600	600
SOUTH AFRICA	1842	1842	1842	1842	0	0
TURKEY	0	0	0	0	0	0
Subtotal	6531	6635	9187	13485	11633	10979
World Total	351096	339752	314997	291963	232086	171749

Exhibit F

DOE/EIA-0035(98/10)
Distribution Category UC-950

Monthly Energy Review

October 1998

Energy Information Administration
Office of Energy Markets and End Use
U.S. Department of Energy
Washington, DC 20585

Section 8. Nuclear Energy

In July 1998, U.S. nuclear generating units produced a total of 61 net terawatthours (billion kilowatthours) of electricity, 7 percent higher than in July 1997. Nuclear units generated at an average capacity factor of 85.5 percent, 8.8 percentage points higher than in July 1997. Nuclear power supplied 19.4 percent of the total electric utility-generated electricity in July 1998 compared with 18.8 in July 1997.

On July 31, 1998, there were 104 operable nuclear generating units in the United States, with a collective net summer capability of 96.6 million kilowatts of electricity.

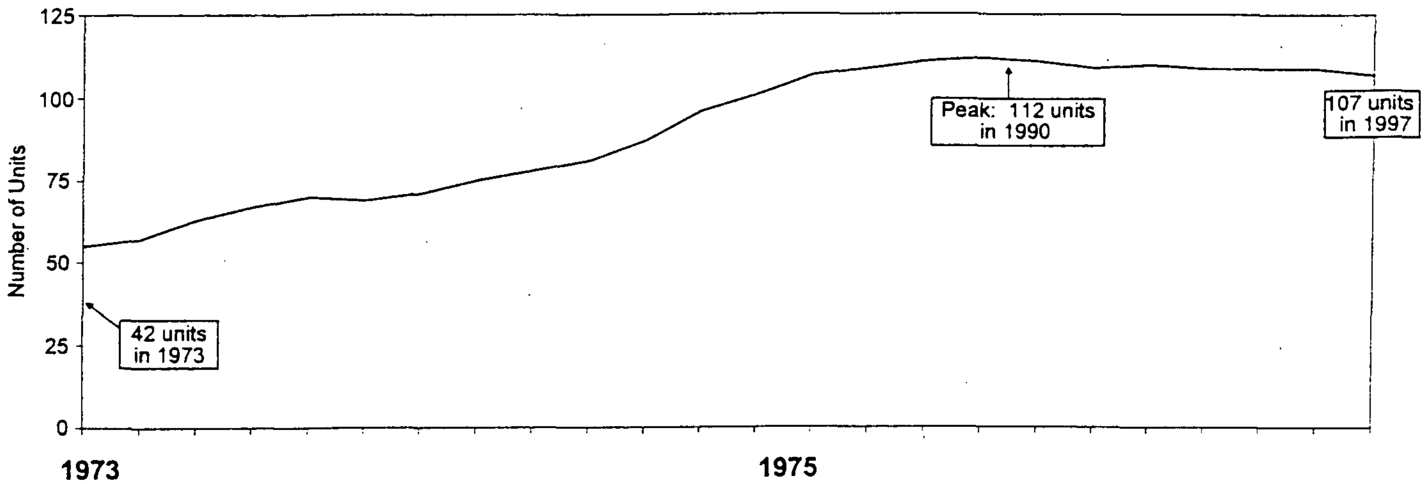
Of the 104 operable units, 14 units generated no electricity during the month because of maintenance, refueling, or repair outage. By comparison, a total of 69 units were reported operating at 90 percent of capacity or more in July. Of these 69 units, a total of 8 operated at 100 percent or greater (based on net summer capability).

In addition, there were 3 other units with construction permits, although construction for all 3 units has been halted. The design capacity of the 3 units with construction permits was 3.6 million kilowatts.

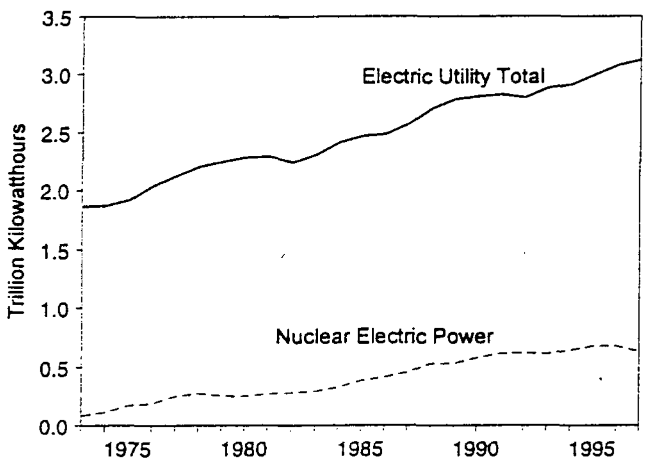
According to the Nuclear Regulatory Commission, Millstone 1 was permanently shut down in July 1998, reducing the number of total operable units to 104 in July 1998.

Figure 8.1 Nuclear Power Plant Operations

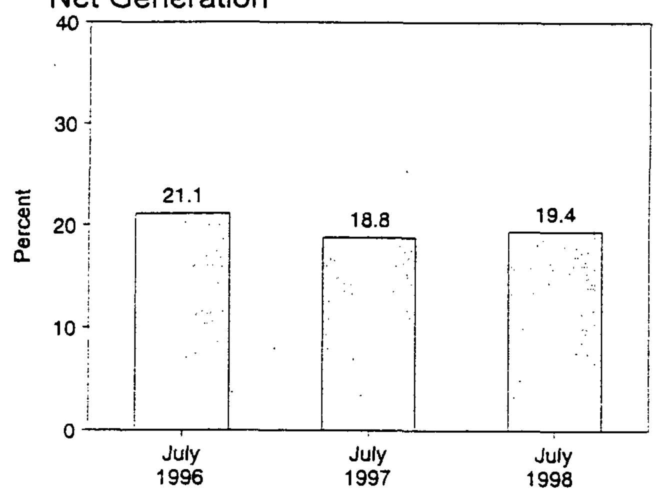
Operable Units,[a] End of Year, 1973-1997



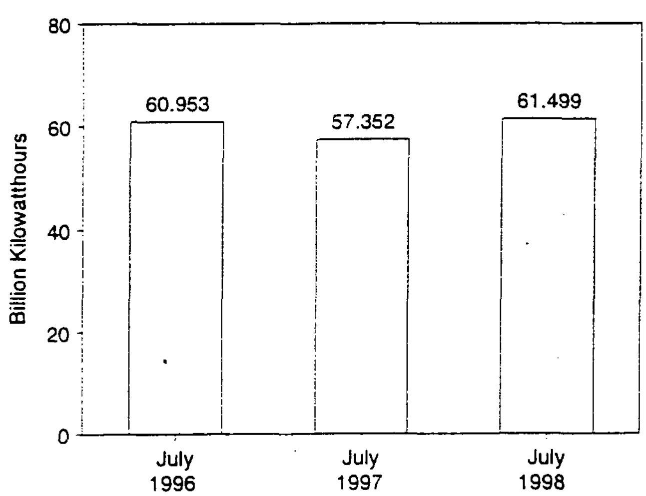
Electric Utility Net Generation, 1973-1997



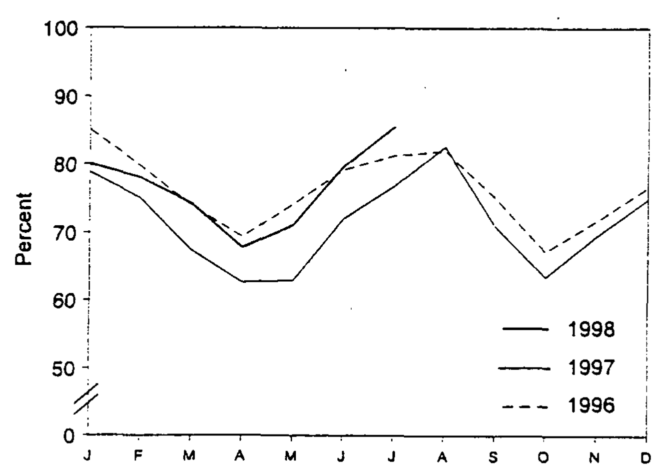
Nuclear Share of Electric Utility Net Generation



Nuclear Electricity Net Generation



Capacity Factor, Monthly



[a]All units that contributed power to the commercial grid whether or not they were owned by an electric utility. See Note 1 at end of section for additional information.
[b]At electric utilities.
Note: Because vertical scales differ, graphs should not be compared.
Sources: Tables 7.1 and 8.1.

Table 8.1 Nuclear Power Plant Operations

	Nuclear Electricity Net Generation[a]	Nuclear Share of Electric Utility Net Generation	Net Summer Capability of Operable Units[a,b,c]	Capacity Factor[a,d]
	Million Kilowatthours	Percent	Million Kilowatts	Percent
1973 Year	83,479	4.5	22.683	53.5
1974 Year	113,976	6.1	31.867	47.8
1975 Year	172,505	9.0	37.267	55.9
1976 Year	191,104	9.4	43.822	54.7
1977 Year	250,883	11.8	46.303	63.3
1978 Year	276,403	12.5	50.824	64.5
1979 Year	255,155	11.4	49.747	58.4
1980 Year	251,116	11.0	51.810	56.3
1981 Year	272,674	11.9	56.042	58.2
1982 Year	282,773	12.6	60.035	56.6
1983 Year	293,677	12.7	63.009	54.4
1984 Year	327,634	13.6	69.652	56.3
1985 Year	383,691	15.5	79.397	58.0
1986 Year	414,038	16.6	85.241	56.9
1987 Year	455,270	17.7	93.583	57.4
1988 Year	526,973	19.5	94.695	63.5
1989 Year	529,355	19.0	98.161	62.2
1990 Year	576,862	20.5	99.624	66.0
1991 Year	612,565	21.7	99.589	70.2
1992 Year	618,776	22.1	98.985	70.9
1993 Year	610,291	21.2	99.041	70.5
1994 Year	640,440	22.0	99.148	73.8
1995 Year	673,402	22.5	99.515	77.4
1996 January	62,942	23.4	99.515	85.0
February	55,928	22.8	100.908	79.7
March	55,474	22.4	100.908	73.9
April	50,325	22.2	100.908	69.4
May	55,637	22.1	100.908	74.1
June	57,498	21.4	100.908	79.1
July	60,953	21.1	100.908	81.2
August	61,477	21.2	100.908	81.9
September	54,593	21.8	100.908	75.1
October	50,612	21.1	100.908	67.3
November	52,132	21.6	100.908	71.8
December	57,159	22.2	100.348	76.6
Year	**674,729**	**21.9**	**100.348**	**76.2**
1997 January	58,914	21.5	100.348	78.8
February	50,658	21.7	100.348	75.0
March	50,414	20.6	100.348	67.4
April	44,883	19.5	100.348	62.6
May	47,032	19.3	100.348	62.9
June	52,095	19.5	100.348	72.0
July	57,352	18.8	100.348	76.7
August	61,084	20.7	99.383	82.5
September	52,586	19.7	99.383	71.0
October	46,981	18.6	99.383	63.5
November	51,189	21.0	99.383	69.6
December	55,457	20.7	99.383	74.9
Year	**628,644**	**20.1**	**99.383**	**71.4**
1998 January	57,889	21.8	97.303	80.0
February	50,999	21.7	97.303	78.0
March	53,711	21.0	97.303	74.2
April	47,503	20.4	97.303	67.8
May	51,496	19.4	97.303	71.1
June	55,732	19.1	97.303	79.6
July	61,499	19.4	96.643	85.5
7-Month Total	**378,829**	**20.3**	**96.643**	**76.6**
1997 7-Month Total	**361,348**	**20.1**	**100.348**	**70.8**
1996 7-Month Total	**398,756**	**22.2**	**100.908**	**77.5**

[a] At electric utilities.
[b] At end of period.
[c] For the definition of "Net Summer Capability," see Note 3 at end of section .
[d] For an explanation of the method of calculating the capacity factor, see Note 2 at end of section.

Notes: • The performance data shown in this table are based on a universe of reactor units that differs in some respects from the reactor universe used to profile the nuclear power industry in Table 8.2. See Note 1 at end of section for further discussion. • Nuclear electricity net generation totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 States and the District of Columbia.

Sources: See end of section.

Table 8.2 Nuclear Generating Units

	Orders[a]	Construction Permits[b]	Low Power Operating Licenses[c]	New Operable Units[d]	Shutdowns[e]	Total Operable Units[f]	Cancellations[g]	Cumulative Cancellations
1973 Year	42	14	12	15	0	42	0	7
1974 Year	28	23	14	15	2	55	9	16
1975 Year	4	9	3	2	0	57	13	29
1976 Year	3	9	7	7	1	63	1	30
1977 Year	4	15	4	4	0	67	10	40
1978 Year	2	13	3	4	1	70	13	53
1979 Year	0	2	0	0	1	69	6	59
1980 Year	0	0	5	2	0	71	15	74
1981 Year	0	0	3	4	0	75	9	83
1982 Year	0	0	6	4	1	78	18	101
1983 Year	0	0	3	3	0	81	6	107
1984 Year	0	0	7	6	0	87	6	113
1985 Year	0	0	7	9	0	96	2	115
1986 Year	0	0	7	5	0	101	2	117
1987 Year	0	0	6	8	2	107	0	117
1988 Year	0	0	1	2	0	109	3	120
1989 Year	0	0	3	4	2	111	0	120
1990 Year	0	0	1	2	1	112	1	121
1991 Year	0	0	0	0	1	111	0	121
1992 Year	0	0	0	0	2	109	0	121
1993 Year	0	0	1	1	0	110	0	121
1994 Year	0	0	0	0	1	109	1	122
1995 Year	0	0	1	0	0	109	2	124
1996 January	0	0	0	0	0	109	0	124
February	0	0	0	1	0	110	0	124
March	0	0	0	0	0	110	0	124
April	0	0	0	0	0	110	0	124
May	0	0	0	0	0	110	0	124
June	0	0	0	0	0	110	0	124
July	0	0	0	0	0	110	0	124
August	0	0	0	0	0	110	0	124
September	0	0	0	0	0	110	0	124
October	0	0	0	0	0	110	0	124
November	0	0	0	0	0	110	0	124
December	0	0	0	0	1	109	0	124
Year	0	0	0	1	1	109	0	124
1997 January	0	0	0	0	0	109	0	124
February	0	0	0	0	0	109	0	124
March	0	0	0	0	0	109	0	124
April	0	0	0	0	0	109	0	124
May	0	0	0	0	0	109	0	124
June	0	0	0	0	0	109	0	124
July	0	0	0	0	0	109	0	124
August	0	0	0	0	2	107	0	124
September	0	0	0	0	0	107	0	124
October	0	0	0	0	0	107	0	124
November	0	0	0	0	0	107	0	124
December	0	0	0	0	0	107	0	124
Year	0	0	0	0	2	107	0	124
1998 January	0	0	0	0	2	105	0	124
February	0	0	0	0	0	105	0	124
March	0	0	0	0	0	105	0	124
April	0	0	0	0	0	105	0	124
May	0	0	0	0	0	105	0	124
June	0	0	0	0	0	105	0	124
July	0	0	0	0	1	104	0	124

[a] Placement of an order by a utility or government agency for a nuclear steam supply system.
[b] Issuance by regulatory authority of a permit, or equivalent permission, to begin construction. Numbers reflect permits issued in a given year, not extant permits.
[c] Issuance by regulatory authority of license, or equivalent permission, to conduct testing but not to operate at full power.
[d] Issuance by regulatory authority of full-power operating license, or equivalent permission. Units generally did not begin immediate operation. See Note 1 at end of section.
[e] Ceased operating permanently, irrespective of intent.
[f] Total of units holding full-power licenses, or equivalent permission to operate, at the end of the period. See Note 1 at end of section.
[g] Cancellation by utilities of ordered units. Does not include three units (Bellefonte 1 and 2 and Watts Bar 2) where construction has been stopped indefinitely.

Note: This table covers all units that contributed power to the commercial grid whether or not they were owned by an electric utility. See Note 1 at end of section for additional information.

Sources: See end of section.

Nuclear Energy Notes

1. In 1998 EIA undertook a major revision of the data categories in Table 8.2 to make them more relevant to current conditions and trends in the U.S. commercial nuclear electric power industry. To acquire the data for the revised categories it was necessary to develop a reactor unit database employing different sources than those used previously for Table 8.2 and still used for Table 8.1. Because of differences in definitions and tally protocols, the year-by-year tallies of operable reactors in the two databases diverge in some years, although this divergence does not change the overall trends.

The data in Table 8.2 apply to commercial nuclear power units, which means that the units contributed power to the commercial electricity grid whether or not they were owned by an electric utility. A total of 259 units ever ordered was identified. (Many of the orders were placed before 1973 and thus do not appear in the table. Annual data on orders and other characteristics from 1953 forward can be found in EIA's *Annual Energy Review 1997*, Tables 9.1 and 9.2.) Although most orders were placed by electric utilities, several units are or were ordered, owned, and operated wholly or in part by the Federal government, including BONUS (Boiling Nuclear Superheater Power Station), Elk River, Experimental Breeder Reactor 2, Hallam, Hanford N, Piqua, and Shippingport.

A reactor is generally defined as operable in Table 8.2 while it possessed a full-power license from the Nuclear Regulatory Commission or its predecessor the Atomic Energy Commission, or equivalent permission to operate, at the end of the year or month shown. The definition is liberal in that it does not exclude units retaining full-power licenses during long, non-routine shutdowns that for a time rendered them unable to generate electricity. For example:

- In 1985 the five then-active Tennessee Valley Authority units (Browns Ferry 1, 2, and 3 and Sequoyah 1 and 2) were shut down under a regulatory forced outage. Browns Ferry 1 remains shut down and has been defueled, while the other units were idle for several years, restarting in 1991, 1995, 1988, and 1988, respectively. All five units are counted as operable during the shutdowns.
- Shippingport was shut down from 1974 through 1976 for conversion to a light-water breeder reactor, but is counted as operable from 1957 until its retirement in 1982.
- Calvert Cliffs 2 was shut down in 1989 and 1990 for replacement of pressurizer heater sleeves but is counted as operable during those years.

Exceptions to the definition are Shoreham and Three Mile Island 2. Shoreham was granted a full-power license in April 1989, but was shut down two months later and never restarted. In 1991, the license was changed to Possession Only. Although not operable at the end of the year, Shoreham is treated as operable during 1989 and shut down in 1990, because counting it as operable and shut down in the same year would introduce a statistical discrepancy in the tallies. A major accident closed Three Mile Island 2 in 1979, and although the unit retained its full-power license for several years, it is considered permanently shut down since that year.

2. Capacity: Nuclear generating units may have more than one type of net capacity rating, including the following:

(a) Net Summer Capability—The steady hourly output that generating equipment is expected to supply to system load, exclusive of auxiliary power, as demonstrated by test at the time of summer peak demand. Auxiliary power of a typical nuclear power plant is about 5 percent of gross generation.

(b) Net Design Capacity or Net Design Electrical Rating (DER)—The nominal net electrical output of a unit, specified by the utility and used for plant design.

The monthly capacity factors are computed as the actual monthly generation divided by the maximum possible generation for that month. The maximum possible generation is the number of hours in the month multiplied by the net summer capability at the end of the month. That fraction is then multiplied by 100 to obtain a percentage. Annual capacity factors are averages of the monthly values for that year.

Sources for Table 8.1

Nuclear Electricity Net Generation and Nuclear Share of Electric Utility Net Generation: Table 7.1. **Net Summer Capability of Operable Units: 1973-1982:** Compiled from various sources, primarily DOE, Office of Nuclear Reactor Programs, "U.S. Central Station Nuclear Electric Generating Units: Significant Milestones." **1983 forward:** Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report," and monthly updates as appropriate.

Capacity Factor: EIA, Office of Coal, Nuclear, Electric and Alternate Fuels.

Sources for Table 8.2

Orders: Energy Information Administration, *Commercial Nuclear Power 1991*, Appendix E, September 1991; Nuclear Energy Institute, *Historical Profile of U.S. Nuclear Power Development*, 1988 edition; U.S. Atomic Energy Commission, *1973 Annual Report to Congress, Volume 2, Regulatory Activities* ; various utilities. **Construction Permits:** Nuclear Regulatory Commission, *Information Digest*, 1997 edition, Appendix A; Nuclear Energy Institute, *Historical Profile of U.S. Nuclear Power Development*, 1988 edition; various utility, Federal, and contractor officials. **Low-Power Operating Licenses:** Nuclear Energy Institute, *Historical Profile of U.S. Nuclear Power Development*, 1988 edition; U.S. Department of Energy, *Nuclear Reactors Built, Being Built, and Planned: 1995*; various utility, Federal, and contractor officials. **New Operable Units:** Nuclear Regulatory Commission, *Information Digest*, 1997 edition, Table 11 and Appendices A and B; various utility, Federal, and contractor officials. **Shutdowns:** Energy Information Administration, *Commercial Nuclear Power 1991*, Appendix E; Nuclear Regulatory Commission, *Information Digest*, 1997 edition, Appendix B; U.S. Department of Energy, *Nuclear Reactors Built, Being Built, and Planned: 1995*; Tennessee Valley Authority officials; various Nuclear Regulatory Commission documents. **Total Operable Units:** Running sum of new operable units minus permanent shutdowns. **Cancellations:** Energy Information Administration, *Commercial Nuclear Power 1991*, Appendix E, September 1991; Nuclear Regulatory Commission, *Information Digest*, 1997 edition, Appendix C; and Nuclear Energy Institute, *Historical Profile of U.S. Nuclear Power Development*, 1988 edition.

Exhibit G

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

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Roger Hannah (Phone 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-98-60

October 13, 1998

NRC STAFF TO HOLD INFORMAL PUBLIC HEARING ON OCTOBER 26

ON PETITION TO REVOKE OPERATING LICENSE FOR BROWNS FERRY UNIT 1

Meeting Scheduled For 1:00 p.m. In Plant Training Center

The Nuclear Regulatory Commission staff has scheduled an informal public hearing on October 26 at the Tennessee Valley Authority's Browns Ferry nuclear power plant near Athens, Alabama on a petition filed by the Union of Concerned Scientists requesting that the NRC revoke the operating license of Browns Ferry Unit 1. The meeting will begin at 1:00 p.m. in the plant training center, located near the intersection of Shaw Road and Nuclear Plant Road.

The informal hearing is intended to provide additional information from the petitioner, TVA and the public to assist the NRC staff in its evaluation of the merits of the petition. Members of the public who are interested in making presentations should contact Albert W. De Agazio of the NRC's Office of Nuclear Reactor Regulation at least five working days prior to the date of the informal hearing by calling (301) 415-1443. Written statements will also be accepted and included in the hearing record. Written statements should be mailed to: U.S. Nuclear Regulatory Commission, Mail Stop O-14B21, Attention: Albert W. De Agazio, Washington, D. C. 20555.

In a letter dated April 5 of this year, the UCS submitted to the NRC a petition requesting that (1) the operating license of Browns Ferry Unit 1, which has been shut down since June 1, 1985, be revoked and (2) that the NRC require TVA to submit either a decommissioning plan or a lay-up plan for Unit 1 which the UCS says would provide assurance that the Unit's irradiated (spent) fuel is safely stored and that Units 2 and 3, currently in operation, are sufficiently independent of Unit 1.

The UCS petition's position is that a relicensing requirement for Unit 1 would be a better, safer process than the current restart process which would be used under NRC regulations.

NRC Home Page | News and Information | E-mail

Exhibit H

Plant Status Report

See Site Location for Plant information.
See Defined Terms for Plant Operational "Modes" and "Conditions."
Ignore "Phone" number, used only by NRC Operations Center Personnel.

NRC OPERATIONS CENTER
PLANT STATUS REPORT FOR 12/17/1998
UNEVALUATED INFORMATION PROVIDED BY THE FACILITY

REG	PLANT NAME	%PWR	DOWN	REASON OR COMMENT	*	#
1	BEAVER VALLEY 1	100				
1	BEAVER VALLEY 2	100				
1	CALVERT CLIFFS 1	100				
1	CALVERT CLIFFS 2	100				
1	FITZPATRICK 1	0	10/16/98	Startup REFUELING OUTAGE		
1	GINNA 1	100				
1	HOPE CREEK 1	100				
1	INDIAN POINT 2	99				
1	INDIAN POINT 3	100			*	
1	LIMERICK 1	24		Power Operation STARTUP TESTING	*	
1	LIMERICK 2	100				
1	MILLSTONE 2	0	02/20/96	Refueling REFUELING OUTAGE - DEFUELED		
1	MILLSTONE 3	0	12/11/98	Cold Shutdown MAINTENANCE OUTAGE		
1	NINE MILE POINT 1	100				
1	NINE MILE POINT 2	100				
1	OYSTER CREEK 1	100				
1	PEACH BOTTOM 2	100				
1	PEACH BOTTOM 3	100				
1	PILGRIM 1	100				
1	SALEM 1	100				
1	SALEM 2	100				
1	SEABROOK 1	100				
1	SUSQUEHANNA 1	100				
1	SUSQUEHANNA 2	100				
1	THREE MILE ISLAND 1	100				

1	VERMONT YANKEE 1	100				

NRC OPERATIONS CENTER
PLANT STATUS REPORT FOR 12/17/1998
UNEVALUATED INFORMATION PROVIDED BY THE FACILITY

REG	PLANT NAME	%PWR	DOWN	REASON OR COMMENT	*	#
2	BROWNS FERRY 1	0	03/03/85	Refueling DEFUELED		
2	BROWNS FERRY 2	100				
2	BROWNS FERRY 3	100				
2	BRUNSWICK 1	100				
2	BRUNSWICK 2	100				
2	CATAWBA 1	100				
2	CATAWBA 2	100				
2	CRYSTAL RIVER 3	100				
2	FARLEY 1	0	10/17/98	Refueling REFUELING OUTAGE		
2	FARLEY 2	100				
2	HARRIS 1	100			*	
2	HATCH 1	100				
2	HATCH 2	98				
2	MCGUIRE 1	100				
2	MCGUIRE 2	100				
2	NORTH ANNA 1	100				
2	NORTH ANNA 2	100				
2	OCONEE 1	100				
2	OCONEE 2	100				
2	OCONEE 3	0	10/08/98	Cold Shutdown REFUELING OUTAGE		
2	ROBINSON 2	100				
2	SEQUOYAH 1	100				
2	SEQUOYAH 2	100				
2	ST LUCIE 1	98			*	
2	ST LUCIE 2	100				
2	SUMMER 1	100				
2	SURRY 1	100				
2	SURRY 2	100				

2	TURKEY POINT 3	100			
2	TURKEY POINT 4	100			
2	VOGTLE 1	100			
2	VOGTLE 2	100			
2	WATTS BAR 1	100			

NRC OPERATIONS CENTER
PLANT STATUS REPORT FOR 12/17/1998
UNEVALUATED INFORMATION PROVIDED BY THE FACILITY

REG	PLANT NAME	%PWR	DOWN	REASON OR COMMENT	* #
3	BRAIDWOOD 1	100			
3	BRAIDWOOD 2	100			
3	BYRON 1	100			
3	BYRON 2	100			
3	CLINTON 1	0	09/06/96	Cold Shutdown REFUELING OUTAGE	
3	COOK 1	0	09/08/97	Cold Shutdown MAINTENANCE OUTAGE	
3	COOK 2	0	09/09/97	Cold Shutdown REFUELING OUTAGE	
3	DAVIS BESSE 1	100			
3	DRESDEN 2	99			
3	DRESDEN 3	99			
3	DUANE ARNOLD 1	0	12/15/98	Cold Shutdown MAINTENANCE OUTAGE - REPAIRING A MAIN FEEDWATER LINE LEAK	
3	FERMI 2	96		Power Operation ADMINISTRATIVE POWER LIMIT	
3	KEWAUNEE 1	94		Power Operation POWER LIMITED DUE TO STEAM GENERATOR TUBE PLUGGING	
3	LASALLE 1	100			
3	LASALLE 2	0	09/20/96	Refueling REFUELING OUTAGE - DEFUELED	
3	MONTICELLO 1	100			
3	PALISADES 1	0	12/14/98	Cold Shutdown MAINTENANCE OUTAGE	
3	PERRY 1	100			
3	POINT BEACH 1	100			
3	POINT BEACH 2	0	12/04/98	Refueling REFUELING OUTAGE	
3	PRAIRIE ISLAND 1	100			

3	PRAIRIE ISLAND 2	0	11/09/98	Refueling Shutdown REFUELING OUTAGE	
3	QUAD CITIES 1	99			*
3	QUAD CITIES 2	100			

NRC OPERATIONS CENTER
PLANT STATUS REPORT FOR 12/17/1998
UNEVALUATED INFORMATION PROVIDED BY THE FACILITY

REG	PLANT NAME	%PWR	DOWN	REASON OR COMMENT	*	#
4	ARKANSAS NUCLEAR 1	100				
4	ARKANSAS NUCLEAR 2	96		Power Operation COASTDOWN TO REFUELING OUTAGE	*	
4	CALLAWAY 1	100				
4	COMANCHE PEAK 1	100				
4	COMANCHE PEAK 2	100				
4	COOPER 1	1		Startup STARTUP TESTING	*	
4	DIABLO CANYON 1	40		Power Operation SHUTTING DOWN TO REPAIR A LEAK FROM A CRACKED WELD OR PIPE ON THE COMPONENT COOLING WATER HEAT EXCHANGER INSIDE CONTAINMENT	*	
4	DIABLO CANYON 2	100				
4	FT CALHOUN 1	100				
4	GRAND GULF 1	100				
4	PALO VERDE 1	100				
4	PALO VERDE 2	100				
4	PALO VERDE 3	100				
4	RIVER BEND 1	99				
4	SAN ONOFRE 2	100				
4	SAN ONOFRE 3	100				
4	SOUTH TEXAS 1	100				
4	SOUTH TEXAS 2	100				
4	WASHINGTON NUCLEAR 2	98			*	
4	WATERFORD 3	100				
4	WOLF CREEK 1	100				

* - REASON OR COMMENT HAS BEEN CHANGED IN PAST 24 HOURS
\# - NUMBER OF REACTOR SCRAMS WITHIN PAST 24 HOURS
NOTE - REACTOR STATUS DATA COLLECTED BETWEEN
4 A.M. AND 8 A.M. EACH DAY.
ALL TIMES ARE BASED ON EASTERN TIMES (ET).

Exhibit I

Nuclear Regulatory Commission

Office of Public Affairs

Washington DC 20555

Telephone: 301/415-8200 -- E-mail: opa@nrc.gov

No. 98-124

July 23, 1998

NRC TO HOLD INFORMAL PUBLIC HEARING ON PETITION TO REVOKE, MODIFY OR SUSPEND OPERATING LICENSE FOR D.C. COOK PLANT

The Nuclear Regulatory Commission staff will hold an informal public hearing August 19 in Rockville, Maryland, on a petition that asks NRC to revoke, modify or suspend the operating license of the D.C. Cook nuclear power plant, Units 1 and 2. The plant is located near Benton Harbor, Michigan.

The hearing will be held at 9 a.m. on August 19 in Rooms T-09A1-T-09F5 at the NRC headquarters at theTwo White Flint North building , 11545 Rockville Pike.

The hearing will be held in response to a petition filed October 9, 1997 by the Union of Concerned Scientists regarding safety problems with the ice condenser containment at the D.C. Cook plant. The system uses thousands of pounds of ice to absorb heat energy released during certain accident conditions. The petition was amended January 12, presenting additional information on six other concerns at the plant. It seeks revocation, modification or suspension of the D.C. Cook operating license until NRC has reasonable assurance that the plant meets the design commitments made when the license was issued.

The hearing is intended to provide additional information from the petitioner, the licensee, Indiana/Michigan Power Company, and the public for NRC staff to evaluate the petition. Members of the public who are interested in making presentations should contact John Stang of the NRC's Office of Nuclear Reactor Regulation at (301) 415-1345.

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Exhibit J

The Ux Weekly

Whither the Spot Uranium Market?

One of the outstanding features of the spot uranium market so far this year is that volume has been quite low, approximately 6 million pounds U_3O_8 equivalent. On an annualized basis, this is far less than the yearly volume during the 1990s, which has averaged about 30 million lbs U_3O_8e. The question is whether this is an aberration or part of a larger trend, and if it is a trend, what are the implications for the market.

A historic view of spot volume—The chart on page 2 shows that during the 1990-1995 period, spot uranium volume varied between 30 million lbs U_3O_8e to over 40 million lbs (in 1995). After 1995, spot volume dropped to about 20 million lbs in both 1996 and 1997 and stands to be much less this year. In this respect, there has definitely been a downward trend in spot volume during the second half of the 1990s.

What happened?—The downward trend in spot volume began after spot prices shot upwards during the first part of 1996. Spot volume during the second half of the year was only 8 million lbs U_3O_8e compared to first-half volume of 14 million lbs. This was no coincidence. After the price increase, utilities began to exercise upward quantity flexibilities in their existing long-term contracts, taking more deliveries under these contracts and greatly reducing their potential to buy on the spot market.

Other factors contributing to shrinking spot market volume from a utility standpoint were operational problems with and premature shutdowns of reactors, mainly in the U.S., and downward revisions in inventory policies, primarily by non-U.S. utilities. Certain utilities which have traditionally made spot purchases had no need to buy when their reactors were off line or when supplies from a prematurely shut down reactor became available to other reactors in their system.

Spot buying by producers and traders also fell. Producers have not been as active defending the market as they have in the past, and the reduction in trader spot buying reflects their changed role in the market. In the past, traders were more market makers, seeking to push the market to its bottom or top more quickly by their selling or buying activity. Now, traders act more as conduits for CIS supplies instead of actively trading in the spot market.

Is uranium becoming more like enrichment?—Declining spot volume in uranium raises the question whether the uranium market is becoming more like enrichment, where spot volume has declined to the point that it now represents a minor percentage of total activity. From the standpoint of industry structure, uranium has become more like enrichment in that now it is dominated by a handful of major suppliers. To the extent that these suppliers are successful in capturing market share by committing current and prospective projects under long-term contracts, future spot demand will be reduced. Large uranium producers have also sought to purchase the Russian HEU feed and deliver it through their long-term contracts, in a manner similar to what USEC is doing with the HEU SWU.

Implications for prices—Obviously, low spot volume has been a major contributor to low prices this year, as well as the general decline in price that has been witnessed since the middle of 1996. As long as spot volume remains low, it is more likely that price will be under downward pressure. Of course, the level of price depends on the balance between spot supply and demand, so price could increase even with low spot demand if spot supply were also low. However, low spot demand leaves the market much more vulnerable to the appearance of any large blocks of supply.

This brings up an interesting question. If spot uranium volume stays low, will producers want to continue referencing spot prices in long-term contracts, given the potential for spot prices to be pushed to lower levels. The use of market price contracts in uranium represents a major difference between uranium and enrichment, and one reason that enrichers have shied away from this practice is the thinness of the spot enrichment market.

A key factor influencing future spot demand in the current market is how utilities exercise the quantity flexibilities in their long-term contracts. As discussed above, the decline in spot volume was largely a function of utilities exercising upward quantity flexibilities. If this trend changes, and there is some evidence that it is, spot demand could begin to grow again. Important questions are how much growth will occur and whether this growth will catch the market off-guard as it has at times in the past.

Volume 12
Issue 40

Internet: www.uxc.com

As published by The Ux Consulting Company, LLC

Weekly Ux Prices

U_3O_8
$9.70
(-0.20)

CIS U_3O_8
$9.05
(Unch.)

NEWS BRIEFS

Incumbent party prevails in Australian elections—Prime Minister John Howard's Liberal-National coalition government narrowly won re-election in Australia on Saturday, and in the process suffered a reduced majority in Parliament. Poll results out of Australia indicate that the coalition's old majority of over 40 seats is now down to a reported eight seats.

The election news is positive for Australia's uranium industry as the main opposition Labor Party, led by Kim Beazley, had threatened to immediately enact a "no new mines" policy which aimed to prevent the start-up of future uranium mines in Australia. The election result keeps the Liberal-National coalition in power for the next three years, giving it a chance to push through its tax reform agenda which was a major issue in the recent election.

USEC begins AVLIS siting process, releases 10K—USEC Inc. announced on Monday that it has initiated a site selection process for a new production facility utilizing AVLIS, its next-generation laser-based uranium enrichment process. Currently, sites are being considered to host this new hi-tech facility and a decision on the selected site is expected early next year. Prospective sites will be evaluated based on environmental and socio-economic factors, construction and operating costs, and community support. The new AVLIS enrichment facility is expected to cost over $2 billion to build with a construction workforce of 1,900 expected. The completed facility is expected to employ approximately 1,300 workers in technical, manufacturing and administrative areas.

USEC Inc. has released its annual report (SEC form 10-K) for fiscal year 1998 (FY98), which ended June 30, 1998. The company reported that based on total revenue of $1.421.2 billion, U.S. SWU customers accounted for 63 percent of the total, Asian customers represented 31 percent, while European and other customers made up the remaining 6 percent. The company also reported that no one customer accounted for more than 10% of revenue in either FY97 or FY98. Uranium sales to electricity customers increased to $40.8 million in FY98, compared with $25.9 million in FY97.

Under the contract for the Russian HEU agreement, USEC ordered 4.4 million SWU in calendar year 1998, of which 0.8 million SWU had been delivered by June 30, 1998. The company purchased 3.6 million SWU derived from HEU at a cost of $315.8 million for FY98. USEC has committed orders for 5.5 million SWU annually in calendar years 1999, 2000 and 2001 at an annual cost of $475.8 million. Although the quantities and pricing mechanism for establishing prices for SWU purchases from 1999 through 2001 have been set, the prices are subject to adjustment based on U.S. inflation.

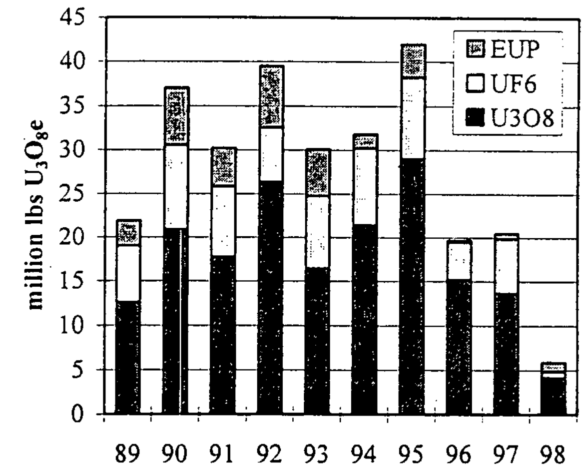
The company estimates the value of its long-term requirements SWU contracts with utilities at $3.8 billion though FY2001 and $7.2 billion through FY 2009.

Urenco files for license to increase Gronau capacity—Urenco Deutschland has filed an applica-

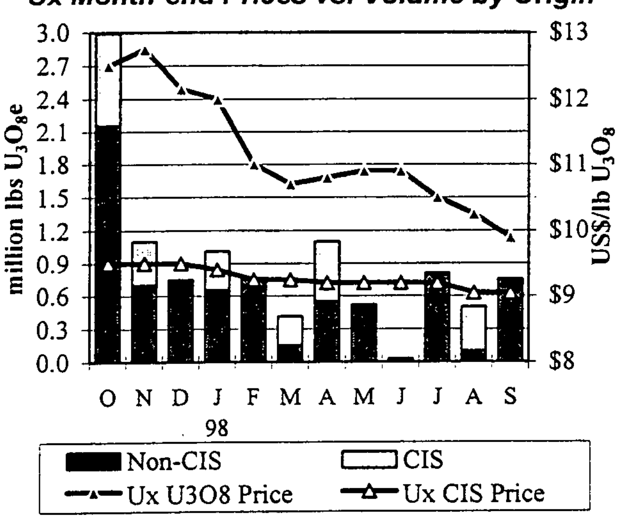
— **Industry Calendar** —

- *October 4-7—NEI's International Uranium Fuel Seminar '98 will be held in Tucson, Arizona.*
- **November 18-20**—Uranium Asia-Market Outlook '98 presented by IBC Asia in Guangzhou, China.
- **April 11-14, 1999**—NEI's Fuel Cycle '99 will be held in Austin, Texas.
- **May 16-19, 1999**—WNFM's 26th Annual Meeting will be held in Beaver Creek, Colorado.

Annual Spot Uranium Volume, 1989-1998



Ux Month-end Prices vs. Volume by Origin



NEWS BRIEFS cont...

tion with the North Rhine-Westphalia state government for a nuclear license to increase its Gronau gas centrifuge enrichment plant capacity to 4.0 million SWU per year. Gronau currently has an enrichment capacity of 1.0 million SWU/yr, but is in the process of expanding that capacity to 1.8 million SWU/yr by 2003 or 2004.

In June, Urenco announced that it was planning to approximately double the Gronau plant capacity in the not too distant future. Company officials at that time reported there were plans to construct a new plant at Gronau with a capacity of 1.5 million SWU/yr. If the recent license request is granted, Urenco could expand capacity by another 2.2 million SWU/yr.

PNC era ends, new entity begins—Japan's Power Reactor and Nuclear Fuel Development Corp. (PNC) ended operations this past Wednesday and was replaced on Thursday by the Japan Cycle Development Institute, which is aiming to improve operations following a series of nuclear mishaps and cover-ups committed by PNC. The Japanese Diet enacted two bills in May to replace PNC with the new entity.

The new company will engage in "pragmatic research" to establish a nuclear recycling system that will focus on development of fast-breeder reactors and disposal of spent fuel. The company will continue the Japanese nuclear recycling program which seeks to make use of plutonium from spent fuel. However, within five years from its inception, the new company will withdraw from overseas uranium exploration, uranium enrichment and the development of advanced thermal reactors. One of the company's objectives will be to operate in a manner more transparent to the public.

Ux Month-End Spot U_3O_8 Prices, Volume, Leadtime and Number of Transactions

Month	Ux Price U_3O_8	Ux Price CIS	Volume (mill lbs U_3O_8e)	Average Leadtime Months	# of Trans
Sep '97	$10.85	$9.00	6.5	3.3	18
Oct	$12.50	$9.50	3.0	4.4	12
Nov	$12.75	$9.50	1.1	4.0	3
Dec	$12.15	$9.50	0.8	5.3	3
Jan '98	$12.00	$9.40	1.0	2.7	3
Feb	$11.00	$9.25	0.8	3.0	3
Mar	$10.70	$9.25	0.4	6.0	4
Apr	$10.80	$9.20	1.1	6.0	5
May	$10.90	$9.20	0.5	5.3	3
Jun	$10.90	$9.20	0.03	6.0	1
Jul	$10.50	$9.20	0.8	5.3	3
Aug	$10.25	$9.05	0.5	3.0	3
Sep	$9.90	$9.05	0.8	3.7	6

September Spot Statistics

	September	1998-YTD
U_3O_8e Volume (million lbs)	0.8	5.9
# Transactions	6	31
Avg. Quantity	0.1	0.2
Avg. Leadtime (months)	3.7	4.3
U_3O_8	0.7	4.2
UF_6	-0-	0.7
EUP	0.1	1.0
U.S. Buyers	0.8	3.4
Non-U.S. Buyers	-0-	2.5
Non-CIS Origin	0.8	4.3
CIS Origin	-0-	1.6
Actual Demand Purchases	0.8	5.1
Discretionary Purchases	-0-	0.8
1998 Delivery	0.4	4.4
1999 Delivery	0.4	1.5
SWU Volume (000 SWU)	23	590
Conversion Vol. (000 kgU in UF_6)	38	1,579

WPSC to buy MG&E share of Kewaunee—Wisconsin Public Service Corp. (WPSC) finalized an agreement on Wednesday to buy Madison Gas & Electric Co.'s (MG&E) 17.8 percent share in the Kewaunee Nuclear Power Plant. The agreement is expected to be completed in 2000 and will increase WPSC ownership in the 503 MWe BWR to 59 percent. As part of the deal, WPSC has agreed to build a natural gas-fired combustion turbine for MG&E. The 83 MWe unit will serve MG&E customers during peak times. MG&E will also be granted an option to purchase electricity from WPSC for two years following the date of transfer of ownership and will receive revenue from its share of facilities linked to the nuclear plant.

More importantly for WPSC, the sale of MG&E's share permits the go-ahead for the $90 million project to replace the two steam generators at Kewaunee to keep the reactor operating until at least 2013. MG&E opposed replacing the steam generators and favored shutting down the plant down in 2002, since its cost in replacing the steam generators would have run around $17 million. The steam generators are expected to be replaced shortly after the share transfer is completed.

MG&E states that its main reason for exiting the nuclear power business is because of internal projections that indicate other low-cost electricity could meet its customers' needs. Additionally, the company feels exiting the business will eliminate financial risk for investors and customers when unexpected outages occur.

Cameco offers US$125 million of Preferred

NEWS BRIEFS cont...

Securities—Cameco Corporation has filed a registration statement with the U.S. Securities and Exchange Commission for an offering of $125 million of preferred securities in the U.S. The offering can be increased by up to another $18.75 million pursuant to the underwriters' overallotment option.

The net proceeds from the offering will be used by Cameco to replace a portion of the short-term financing used in acquiring Uranerz Exploration and Mining Limited (UEM) and Uranerz USA, which was completed on August 11, 1998. The offering is being underwritten by a syndicate managed by Merrill Lynch & Co., and also includes Morgan Stanley Dean Witter, PaineWebber Incorporated, Prudential Securities Incorporated and Salomon Barney.

AEP has fourth restart meeting w/NRC—American Electric Power (AEP) officials met with the U.S. NRC on Tuesday to discuss restart schedules for the company's two off-line Cook units. Earlier this month, AEP told the NRC that it expects to return Cook 1 to service by the end of the first quarter of 1999 and Cook 2 approximately 90 days thereafter. Topics of discussion included restart schedule progress, finalization of restart plan strategies, completeness of engineering reviews, restart performance indicators and proposed regulatory submittals to the NRC.

China commences work on Fast Neutron Reactor—China began construction of its first fast neutron reactor power station last Monday, which is scheduled to be finished by 2003, according to Li Zhongping, deputy director of the China Fast Reactor Engineering Headquarters. This new pilot plant, located in southwestern Beijing, will be used to generate thermal power of 65 MWt and electric power of 20 MWe. Additionally, the reactor will serve as the foundation for building China's first commercial fast neutron reactor power station in the early 21st century. Li has stated this new reactor design is believed to be more efficient and has a higher utilization rate of uranium at 60 to 70 percent, compared with existing PWRs at 1 percent.

Deregulation news—U.S. Energy Secretary Bill Richardson turned authority to ensure the nation's electricity grid remains reliable and efficient over to the **Federal Regulatory Commission (FERC)**. With this authority under the Federal Power Act, FERC can now divide the country into regional districts to coordinate movement of electricity supplies within the districts. Although the Energy Department never exercised this type of authority, FERC has been faced with transmission reliability issues as states deregulate their electricity markets, so it is therefore more appropriate for the agency to take on this responsibility. FERC can now establish boundaries among independent system operators (ISO's) to ensure electricity suppliers have fair access to transmission power lines in a particular region.

Cuba's reactor suspended indefinitely—Cuban President Fidel Castro announced in a speech to the Fifth National Congress of Committees for the Defense of the Revolution that the country's soviet-designed VVER-440 Juragua reactor, which began construction under Soviet aid, has been suspended indefinitely. Although work on the reactor has been suspended since 1992, Cuban authorities discussed plans for resurrecting the project which drew critical concern from voices in Washington. Moscow alluded to the possibility of resuming work on the reactor in March of last year, but had not taken any action on the issue in recent months. The reactor, which began construction in 1980, has cost $1 billion and would cost another $750 million and take four years to finish.

Ux Price Definitions

*The Ux Prices indicate, subject to the terms listed, the most competitive spot offers available for the respective product or service, of which The Uranium Exchange Company (Ux) is aware. The **Ux U_3O_8** price includes conditions for quantity, delivery timeframe, origin and location considerations while the **Ux CIS U_3O_8** price is the most competitive price for deliveries up to six months forward without regard to specific quantity or location. Both U_3O_8 prices are published weekly. The **Ux Conversion** price considers spot offers for delivery up to twelve months forward. The **Ux UF_6** value represents the sum of the conversion and U_3O_8 components as discussed above and, therefore, does not necessarily represent the most competitive UF_6 offers available. The **Ux SWU** price considers spot offers for deliveries up to twelve months forward. The Conversion, UF_6 and SWU prices are published the last Monday of each month.*

The Ux Prices represent neither an offer to sell nor a bid to buy the products or services listed.

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THE MARKET

Uranium—The most recent downward trend in the restricted price which began in July continued in September, as price weakened late in the month with a small flurry of deals being completed and/or evaluated. With last month's volume coming in at just over 750 thousand pounds U_3O_8 equivalent in six transactions, and a similar volume currently under evaluation, the market is seeing each transaction eat away at the restricted price. This is not surprising as the end of the year approaches and suppliers seek to lock up sales in what for them has been a dismal year.

At the end of September, the Ux month-end restricted price fell $0.35 to $9.90/lb, while the TradeTech price dropped almost $0.50 to $9.75. However, the largest price drop last month, at $0.60, was seen in the low end of Nukem's price range, which declined to $9.60. The NuclearFuel price range at the end of the month also dropped and narrowed to $9.80-10.20. The cumulative affects of these price changes caused the restricted industry average price (IAP) to decline by $0.38 to $9.86/lb.

So far in 1998, the annual volume of non-restricted material has only been a fraction of the level seen over the past five years. With this decline in non-restricted market activity, the CIS price has stayed in the $9/lb price range for the last 16 months. After falling slightly in August, published CIS uranium spot prices remained unchanged in September, keeping the non-restricted IAP hovering just above the $9.00/lb level.

Conversion—In the face of minimal demand and the availability of aggressive supplies, the month-end prices for conversion fell once again in September. The current price levels are at their lowest since early 1993, prior to the shutdown of Sequoyah Fuels' facility. The Ux price dropped $0.25 to $3.75/kgU. The TradeTech price also fell to $3.75, while the Nukem price range remained constant at $4.00-5.15 keeping the IAP, which fell by $0.17/kgU, up above the $4/kgU mark.

Enrichment—Following two months of moderate activity, spot enrichment volume fell back to lower levels during September. With only one transaction last month involving 23 thousand SWU in the form of EUP, the spot enrichment IAP remained unchanged, at $86 for restricted and $84 for non-restricted SWU, with the non-restricted prices ranging from $83 to $85. This marks the fourth month that the IAP has been at these levels. Last month's small transaction brings the total spot volume for the year up to 590 thousand SWU.

Ux Spot Prices

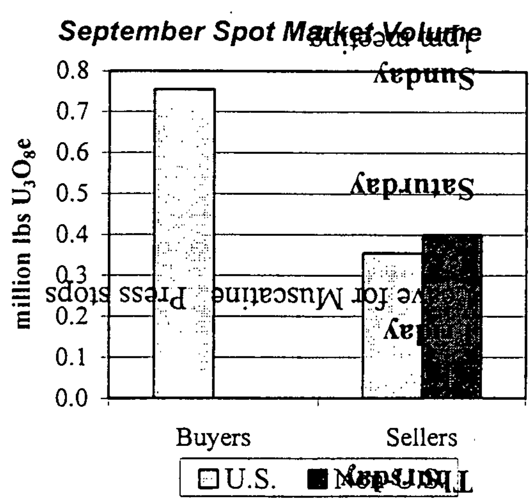
Weekly (10/5/98)

U_3O_8	**$9.70**
Quantities:	3-500,000
Delivery:	4 months
Origin/Location:	
Open/U.S. convertor	
Non-CIS/All others	
Matched/Any location	
CIS U_3O_8	**$9.05**

Industry Spot Prices

	NuclearFuel Low	NuclearFuel High	NUKEM Low	NUKEM High	TradeTech	Ux	Avg.
Weekly (10/5/98)							
U_3O_8 ($/lb)	(10/5)				(9/30)		
Restricted	9.30	9.90	—	—	9.75	9.70	9.68
Non-restr.	8.80	9.10	—	—	9.05	9.05	9.02
Month-end (9/30/98)							
U_3O_8 ($/lb)	(9/21)					(9/28)	
Restricted	9.80	10.20	9.60	10.00	9.75	9.90	9.86
Non-restr.	8.80	9.10	9.05	9.20	9.05	9.05	9.04
Conversion ($/kgU)	—	—	4.00	5.15	3.75	3.75	4.02
UF_6 ($/kgU)							
Restricted	—	—	—	—	29.35	29.62	29.49
Non-restr.	—	—	—	—	27.45	27.39	27.42
SWU ($)							
Restricted	—	—	—	86.00	86.00	86.00	86.00
Non-restr.	—	—	83.00	—	84.00	85.00	84.00

Note: Definitions of these prices vary among companies. They are listed strictly for comparison purposes and are in U.S. dollars. Nukem's SWU price shows limits on its price range.



In Remembrance

Four guys were out on the golf course. As one of them was teeing off at the 10[th] hole, which was next to the highway, they saw a funeral precession go by. Instead of teeing off, the golfer removed his cap and placed it on his chest until the funeral had passed.

At this point, the other three said, "You know, that was the most touching thing I've ever seen." And the guy answers, "Well, I was married to her for 15 years. It was the least I could do!"

Exhibit K

1997 in review

World consumption of energy grew by 1% in 1997, a slower rate than in 1995 and 1996, and below the average for the past 10 years. Continued rapid growth in Emerging Market Economies (EMEs), excluding the Former Soviet Union (FSU), contrasted strongly with very slow growth in the OECD and a fall in Europe. Hydro and oil were the fastest growing fuels, while gas and nuclear use decreased.

Energy developments

Consumption in the FSU continued its long decline, and is now barely 60% of its peak level in 1990. Excluding this factor, world energy consumption grew by 1.6%, only half the rate of growth of the previous three years. Much of this was the result of weather patterns, which depressed energy consumption in North America and Europe.

Other notable features of 1997 included:

• India increased its consumption by 6.1%, to become the world's sixth largest energy market, ahead of France, Canada and the UK

• Ireland saw the largest rise in consumption, up by 9.8%. Rapid growth was also recorded in Spain, Brazil, Indonesia, Iceland and Taiwan

• As a proportion of the global total, other EME consumption continued to rise. Its share has risen by one-third over the last decade, to almost 30%. By contrast, the share of the FSU has almost halved, to just over 10%.

Oil

Oil prices weakened in 1997, with significant falls in both the first and the fourth quarters. The annual average Brent price was 7.3% lower than in 1996.

Oil consumption grew by 2.1%, slightly slower than in 1996, but still significantly faster than at any time since 1988. Growth remained skewed towards other EMEs: Asia (excluding Japan) saw the fastest growth, of 5.1%, followed by South and Central America, with 4.1%. Despite accelerating economic growth, consumption in the USA and Europe increased by only 1%, less than half the increase in 1996, while consumption in Japan fell by 1.3%. Much of this was attributable to weather patterns, with winter in the northern hemisphere milder than normal.

World oil production grew by 3.1%, the fastest rate of growth since 1988. This occurred in spite of much lower growth in non-OPEC production (excluding the FSU), which slowed to 1.4%. The UK saw a 1.6% decline in production, largely owing to maintenance scheduling and some project delays, while US production continued the trend of previous years, falling by 0.9%. Offsetting this, Mexican production rose by 4.4%.

OPEC members increased their production by 5.4%, with the largest increases in incremental volume in Iraq (up 94.3% as exports resumed under UN resolution 986), Saudi Arabia, Venezuela and Nigeria. As a result, OPEC members' share of total world production rose to 41.5%, its highest level in more than a decade.

In the Russian Federation, the unbroken falls in production of the last decade were reversed in 1997, with output growing by 1.6%. Increasing production in Kazakhstan and Uzbekistan contributed to a rise in total FSU production of 2.2%.

Proved world reserves were effectively unchanged in 1997, slightly reducing the ratio of reserves to production to 40.9 years.

Natural gas
World gas consumption fell by 0.2%, the first annual decline since 1975. The FSU's modest resumption of growth in 1996 was not sustained, and consumption fell by 6.4%. Consumption in the OECD area was generally weak (rising by 0.4%) as a result of an unusually mild winter.

Accordingly, world gas production fell slightly (by 0.2%), as growth outside Europe failed to compensate for sharp falls in production in the Russian Federation (down 5.4%) and the Netherlands (down 11.5%).

Production in Europe as a whole was hit by weather-related factors, and fell by 1%. Only in the UK, Norway and Denmark did it increase, as a result of new fields coming on stream. FSU output fell by 6.8%, as growing production in Kazakhstan failed to offset the sharp declines in Russia, Turkmenistan, Azerbaijan and Ukraine.

The most rapid absolute growth was seen in Algeria and Norway, while Kazakhstan, Colombia and Denmark all increased their output by more than 20%.

Total pipeline trade was unchanged on 1996, but LNG trade increased by 10.5%. Algeria increased its exports of LNG by 24% and Malaysia by 15.5%.

Other fuels
After a decade of strong growth, consumption of nuclear energy fell by 0.6%. Almost all this decline resulted from the sharp fall in consumption of 7.2% in the USA and Canada.

After two years of strong growth, coal consumption slowed to 0.8%, reflecting a sharp drop (of 4.1%) in Europe. China and the USA continued to dominate the market, consuming more than 50% of the total.

Hydroelectricity was the fastest growing fuel, with consumption rising by 2.5%, despite a fall of 1.6% in Canada, the world's largest single consumer.

Format of the *Review*

Poland, Hungary and South Korea are now included in all OECD totals. South Korea is no longer included in EMEs totals. Data for China excludes China Hong Kong SAR, which is given separately.

We express our gratitude to our numerous contacts worldwide, both inside and outside BP, who provide the basic data for this publication.

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BP Statistical Review of World Energy 1998

Exhibit L

Footnote 12, 13

I·N·G·A·A

Nuclear Power Plants and Implications of Early Shutdown for Future Natural Gas Demand

PP 63584

Foundation

The INGAA Foundation, Inc.
555 13th Street, NW • Suite 300 West
Washington, D.C. 20004

Nuclear Power Plants and Implications of Early Shutdown for Future Natural Gas Demand

Prepared for the INGAA Foundation, Inc., by:
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Good Performers Group

The good performers group, consisting of 22 sites, also shows notable improvement, and would be news by itself, were it not for the much greater improvements by the top performers. This group can be characterized as having a potential for further improvement, based on the recent past. But all generating sources will be scrutinized in the immediate future for cost cutting. There is more variation in performance within this group than the top group. The range in O&M costs was from 1.07 cents to 2.20 cents/kWh in 1995 (see Table A-I-2 at the end of this chapter). Non-fuel O&M costs for the group decreased 15 percent between 1990 and 1995. The capacity factor ranged from 68 to 97 percent. Capacity factor for 15 of these 22 sites was at or above the average of 79 percent for all sites in 1995. Before the late 1980s, a capacity factor of 80 percent or higher was rare for any nuclear plant.

Poor Performers Group

The 17 sites in this group are clearly vulnerable to early shutdown. For this group, non-fuel O&M costs per kWh have increased 27 percent while capacity factor has decreased by 13 percent, from 1990 to 1995. Most of these sites have been plagued by extended shutdowns for safety or operational problems. There are individual reasons for low performance for each site in this group and a more detailed analysis of the nature of their problems would shed greater light on their vulnerability to shutdown. From Table A-I-3 at the end of this chapter, it is seen that non-fuel O&M costs ranged from 0.90 to 3.89 cents/kWh in 1995. Capacity factor ranged from 17 to 89 percent in 1995. Even for this group, capacity factor of 3 sites was above the 79 percent average for all sites. Five of the sites in this group licenses expire by 2010.

This study's key conclusion is that owners and operators have the ability to improve the performance of their facilities. Therefore, any single plant may change from one performance group to another—most likely to the closest, but potentially to any, group. We are not aware of any fundamental characteristic related to size, age, location, or system vendor that is inconsistent with this finding, although it is generally believed that pressurized water reactors can operate a little less expensively than can boiling water reactors. We anticipate that most changes will move "good

Exhibit M

Questioning the Authority

by James Riccio

Public Citizen

This report was produced through the generous assistance of the Educational Foundation of America.

April 1998

When the results of the EEI report were first aired nuclear utility executives acknowledged that it was a good means for assessing a reactor's competitiveness within its own region. While this analysis is not definitive, it does reveal the sorry state of nuclear economics. The validity of these findings is supported by the current status of the least competitive reactors: Maine Yankee and Big Rock Point have been permanently shutdown; Millstone 1 has been removed from the rate base and future operation of it or unit 2 is still questionable.

The chart reveals several aspects of TVA's problems. The cost of nuclear operations is more expensive than the price of replacement power making TVA's nuclear plants among the least competitive reactors in the nation. While TVA's operations and maintenance (O & M) costs are comparable to other nuclear reactors there still exists a marked disparity between TVA's O & M costs and replacement power. This disparity reflects TVA's access to cheap hydroelectric power from its 29 dams. So long as TVA remains intact, the cheap hydropower can help defer the costs of the nuclear electricity. However, if TVA is put up for sale, it is likely that the TVA's dams and transmission lines would be sold while the expensive nuclear plants would be stranded and left as a taxpayer liability. According to TVA's Chairman Craven Crowell, "...you would find the situation in which some people would come and buy some of the plants, take the cream and leave the skim for the taxpayers. The taxpayers would end up, I believe, in a bail out situation involving the nuclear program."[106]

Despite having all its operable reactors splitting atoms for the first time, TVA fell well short of its own revenue projections for 1997. While TVA's reactors produced over 4 billion more kilowatt hours than planned, TVA sold 1.86 billion fewer kilowatts than projected. This resulted in revenues of $5.45 billion, a budget shortfall for TVA of $221.2 million for 1997.[107] If TVA can not meet its budget projections under the current monopoly protections it now enjoys, its prospects under deregulation are dismal.

TVA is not alone among nuclear utilities that are threatened by deregulation of the electric industry. As the chart illustrates, 42 of the nuclear reactors in the U.S. are more expensive to operate than the cost of replacement power. These reactors will face pressure to cut costs in order to compete in a deregulated environment. If nuclear reactors can not compete in the current market, the prospects for nuclear power under a competitive market are dim and fading. Even if nuclear utilities can bring OandM costs under control, the combination of cheap replacement power and rapid aging of the nuclear reactors will likely doom many of these reactors long before the expiration of their operating licenses. Unfortunately, TVA's atomic debt and non-competitive nuclear reactors are not the only financial liabilities facing the authority.

Conclusions and Recommendations

Conclusions -

The Tennessee Valley Authority was supposed to be the "yard stick" against which other private utility companies were to be judged. Originally, TVA met its mandate. Electric power was brought to the region and economic development followed. However, TVA's expensive flirtation with the atom and its continued reliance on nuclear generated electricity make it one of the least competitive nuclear power programs in the nation. Rather than being the "yard stick" FDR envisioned, TVA's nuclear program has turned the authority into a potential liability for American taxpayers.

Due to the nearly $28 billion debt TVA has amassed, it has been forced to raise rates while competitors will be cutting theirs in order to better compete in a deregulated electricity market. TVA's nuclear program accounts for at least $26 billion dollars of TVA's debt. Over one third of every dollar generated by TVA is spent servicing this debt.

TVA is the only nuclear utility in the nation with reactors that are neither canceled nor completed. Since TVA is not likely to finish the deferred reactors at Watts Bar and Bellefonte, TVA should begin to pay off the $6.3 billion dollars wasted at these three reactors while it still enjoys the monopoly like protections afforded it under current regulation.

The construction and operation of TVA's nuclear reactors has been the most poorly managed in the history of nuclear power. TVA has ordered and subsequently canceled more nuclear capacity than any other utility. TVA's reactors have spent more time on NRC watch list than any other reactors in the U.S. Over the many troubled years of construction and operation of TVA's nuclear program there have been two constants: a lack of quality assurance in the construction and operation of TVA's nuclear reactors and whistle blowers who have been willing to risk their professional lives and livelihoods to point this out.

TVA's Inspector General took steps to ensure that the whistle blower allegations which troubled its nuclear power operations in the 1980s did not resurface as TVA attempted to revive its nuclear option in the 1990s. Unfortunately, TVA and NRC accomplished this by betraying TVA whistle blowers. TVA's IG entered into a memorandum of understanding that turned over the identities of whistle blowers who came to NRC back to TVA for investigation. The identities of at least eleven whistle-blowers were revealed to TVA. But amazingly, investigators within NRC's Office of Investigation in Region II were supposedly unaware of the of the agreement. Remarkably, during the two years following the revelation that TVA and NRC had colluded to betray whistle blowers, TVA still had more whistle blowers' allegations filed against it than any other nuclear utility.

Despite improved economic performance in the short term, TVA's reactors are still more expensive to operate than the cost of replacement power making them among the least competitive reactors in the country. However, TVA's reactors aren't the only ones that will have trouble competing in a competitive electricity market. A total of 42 nuclear reactors from 28 nuclear utilities have operations and maintenance costs that exceed the price of replacement power.

Exhibit N

United States Association For Energy Economics
International Association for Energy Economics

Technology's Critical Role in Energy & Environmental Markets

Conference Proceedings

19th Annual North American Conference
October 18 to 21, 1998
Hyatt Regency Hotel
Albuquerque, New Mexico

United States Association for Energy Economics
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Implications of Premature Nuclear Plant Closures: Funding Shortfalls for Nuclear Plant Decommissioning and Spent Fuel Transportation and Storage

By Bruce Biewald and David White, Synapse Energy Economics, Inc.

Introduction and Summary

This paper summarizes the results of an integrated three-part project dealing with: (1) the prospects for premature nuclear power plant closure, (2) the potential unfunded liability for decommissioning, and (3) the potential unfunded liability for spent nuclear fuel transportation and storage.[1]

When utilities and regulators determine funding amounts for decommissioning it is typically assumed without question that the nuclear generator will continue to produce electricity until the end of its 40-year operating license. Similarly, for determining funding adequacy for the high-level waste disposal program, the Department of Energy typically assumes that all reactors will run to the end of their operating licenses. This faith in the longevity of existing nuclear power plants is unfounded, inconsistent with nuclear experience to date, and can lead to imprudent and inefficient decision-making.

Based upon our comparison of nuclear unit operating costs with projected market prices for electricity, we have developed three projections of nuclear unit retirements. The High, Reference, and Low Nuclear Generation cases have 20, 34, and 90 nuclear units retiring prior to the end of their operating licenses.[2] In each case, the average shutdown for the units closed "prematurely" is about 15 years prior to the end of the license.

We estimate that for the fleet of currently operating nuclear power plants, the investor-owned utilities' portion of the unfunded liability for decommissioning is about $24 billion, at year end 1997 in 1997 dollars. If all of the units would operate to the end of their licenses, the full amount needed for decommissioning could be collected. However, with early retirements, we estimate the unfunded decommissioning liability at time of closure summed for all of the units projected to be retired early to total $4.1 billion, $7.1 billion, and $15.3 billion in 1997 dollars for the High, Reference, and Low Nuclear Generation cases, respectively.

We find that the prospect of plant retirements reducing the revenue stream to fund the disposal of spent nuclear fuel suggests that the current one mill per kWh fee collected by DOE should be increased. Even more significantly, the DOE's cost estimate for implementing the spent fuel disposal program appears to be out-of-date and optimistic. If a recent independent cost assessment putting the total program cost roughly 50% above DOE's estimate is correct, then the fee may have to be increased to something in the range of 2.6 mills per kWh (for the EIA generation projection) to 4.5 mills per kWh (with the Synapse low case nuclear generation projection).

Nuclear Generator Retirements

One need only consider the list of units that have shutdown before the end of their operating licenses to realize that "premature" closure is more than a remote possibility. Table 1 lists the nuclear power plants in the US that have been retired, or for which shutdown has been announced.

Table 1
Retired Nuclear Generating Units With Capacity 40 MW and Larger

Plant	State	Capacity (MWe)	Year Closed	Approximate Age at Retirement (years)
Hallam	Nebraska	75	1964	2
Pathfinder	South Dakota	66	1967	3
Fermi 1	Michigan	61	1972	9
Indian Point 1	New York	265	1974	12
Peach Bottom 1	Pennsylvania	40	1974	8
Humboldt Bay	California	65	1976	14
Dresden 1	Illinois	200	1978	19
Three Mile Island 2	Pennsylvania	926	1979	1
Shippingport	Pennsylvania	72	1982	25
La Crosse	Wisconsin	48	1987	19
Rancho Seco	California	918	1989	15
Shoreham	New York	820	1989	0
Fort St. Vrain	Colorado	330	1989	10
San Onofre 1	California	436	1992	25
Yankee Rowe	Massachusetts	175	1992	31
Trojan	Oregon	918	1992	18
Haddam Neck	Connecticut	582	1996	29
Millstone 1	Connecticut	660	1998	28
Big Rock Point	Michigan	72	*	36
Maine Yankee	Maine	840	*	26
Oyster Creek	New Jersey	650	*	29
Zion 1 and 2	Illinois	2080	*	25

* Announcements have been made concerning the likely retirement of these units (the ages listed are current).

Recent analyses have found that a significant portion of the nuclear fleet is at risk of shutting down on the basis of poor operating economics. Geoff Rothwell (1998) concludes that "if costs are not reduced, there are approximately two dozen units at risk of early retirement before 2006, when nuclear power unit operating licenses begin to expire" (page 12). Jim Riccio's analysis for Public Citizen (1998) compared average nuclear fuel and O&M costs for the 1994 to 1996 period with the estimated cost of replacement power in the region and identified 42 nuclear units that are not competitive. Moody's Investor Services (1995) examined nuclear operating costs, and concluded that there are "at least 10 nuclear plants (out of 109 in the U.S.) that might be closed in the event of deregulation" (page 7). The Interstate Natural Gas Association of America released a report in May, 1998, concluding that 34 of 72 US nuclear reactor sites are vulnerable to shutdown because their annual production costs are higher than projected market prices. A recent survey of utility CEOs and managers found that only 42 percent believe that "nuclear plants can compete in a price conscious market" while less than half (49 percent) believe that "most nuclear plants will remain in operation through their initial license term" – down from 67 percent last year (WIEG, 1998).

In this context of emerging competition in electricity markets and changing perceptions of the ongoing role of nuclear power generation, we set out to analyze the economics of continued plant operation.

Method and Assumptions for Nuclear Plant Retirement Analysis

The prospects for retirement of the nuclear fleet depend primarily upon the operating economics. For the most part, it is reasonable to assume that nuclear units with operating costs above the market value of their electricity will be shut down when subjected to competitive pressure.[3] Here, we've constructed a framework for simulating the unit owners' decision-making on a forward-looking basis. The basic decision-rule is that the expected present value of the costs of operating the unit must be less than the expected present value of the energy produced. Where this is not the case, the unit is assumed to be retired. Projections of present value cost and revenues are done for each unit in each year of the study.[4]

For nuclear operating costs, we calculated averages for the 6 year period from 1992 through 1997. For our Reference case, these recent period averages were simply projected into the future with no change (in real dollars) except for a modest decline in capacity factor during the last five years of a unit's license period. High and Low cases were developed as variations from the reference case, as indicated in Table 2.

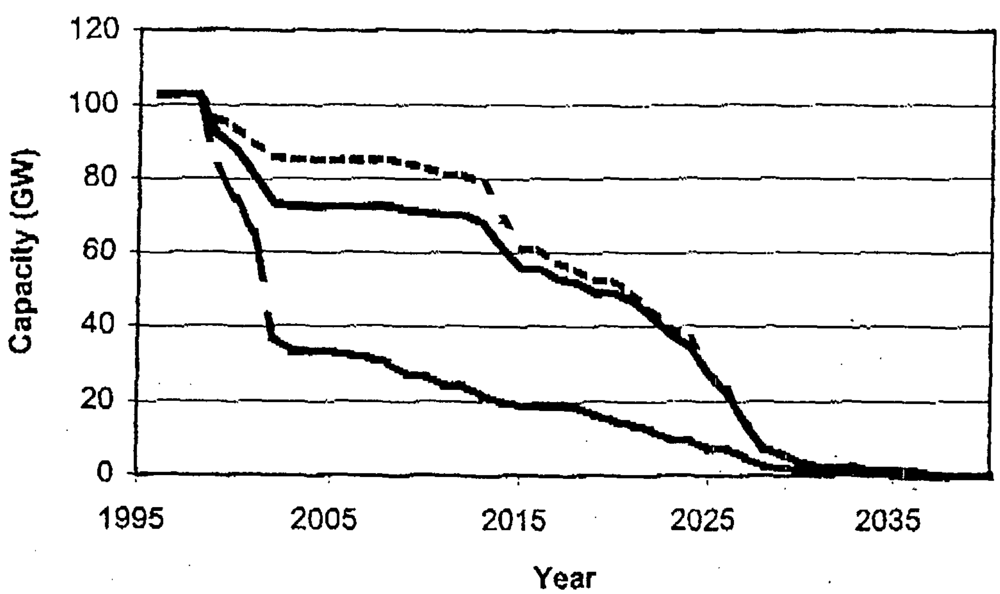
Table 2
Key Input Assumptions to Nuclear Retirement Analysis

Variable	Reference Case	Low Nuclear Generation Case (high nuclear costs and low market prices)	High Nuclear Generation Case (low nuclear costs and high market prices)
Nuclear Capacity Factor	6 year average, with annual decline at 1% in last 5 years of license	6 year average, declining at 0.25% annually, plus annual decline at 2% in last 5 years of license	6 year average, increasing at 0.25% annually, no adjustment for nearing end of license
Nuclear Fuel, O&M and Capital Additions Costs	6 year average cost per kWh, escalating at the general inflation rate	annual escalation at 0.5 percent real	annual decline at 0.5 percent real
Near-term Electricity Value (1996)[5]	1996 regional average of reported marginal energy costs plus $5/MWh for capacity value	7 percent less than the reference case	7 percent greater than the reference case
Long-term Electricity Value (2005 and beyond)	EIA's projected market prices by region (based largely upon the cost of new combined cycle generation with gas)	15 percent less than the reference case in 2020 (based upon EIA's analysis with lower natural gas prices)	13 percent greater than the reference case in 2020 (based upon EIA's analysis with higher natural gas prices)

For the value of generation from the nuclear generators, we used system marginal cost data for 1996 and projections of market prices for electricity by region produced by the EIA using its National Energy Modeling

System (Beamon, 1997). These assumptions, for the base, high, and low cases, are summarized in Table 2. The EIA forecast of market prices includes 2 to 3 mills/kWh for "general and administration" costs, and so 3 mills/kWh of G&A costs were included on the nuclear costs of this analysis. G&A includes labor related benefits and taxes that are typically higher for nuclear plants than for other generating facilities.

Figure 1: Projected Nuclear Capacity in the US



Results of nuclear plant retirement analysis

We find that many existing nuclear units are uneconomical to continue operating. In the reference case, 34 units are found to be uneconomical to operate. Most of these would be retired as soon as they are subjected to competitive pressure.[6] This points to an interesting economic implication of the timing of electric industry restructuring. There appear to be a number of units which are uneconomic over the full period of their remaining lives beginning in 1998, but which would be economic over shorter, later periods due to projected increases in market prices over time. If competition comes slowly or these units are protected from competitive pressures for several years, then their owner/operators may well chose to keep them open despite their uneconomic status.

In the low case, we find that most of the existing fleet of nuclear units is uneconomic to operate, and should be closed. In this case, the extent to which individual nuclear units will be retired early will be moderated by a price feedback. That is, as the first wave of nuclear units are retired, the electricity markets will tighten and the value of capacity and energy will rise. This will make the remaining units relatively more attractive to operate.

In the high case, with very optimistic assumptions for nuclear plant costs and performance, we still find 20 nuclear units to be uneconomic to operate. The projected operating nuclear capacity for the low, reference, and high cases is plotted in Figure 1. Limitations and caveats are identified at the conclusion of this paper, in the section on "further research."

Decommissioning Funding

With decommissioning funding typically based upon the license period of individual nuclear units, it is nearly certain that in the event of a shutdown prior to the end of the operating license there will be a funding shortfall. The extent of the shortfall depends upon when in its license period the unit closes, the pattern of funding, and the interest accumulated on the decommissioning fund. There have been funding shortfalls for each of the nuclear units that has been closed to-date, and this is likely to be the case for many currently operating units that are shut down in the future.

In Table 3, we list the estimated decommissioning cost and the amount in the external decommissioning funds, for all of the investor-owned utilities with large amounts of nuclear entitlements.[7] The total estimated bill for dismantling the fleet amounts to $38.8 billion (in 1997 dollars) while the collected funds are only $15.1 billion as of year end 1997. The current level of the unfunded decommissioning liability amounts to $23.7 billion.

Table 3
Nuclear Plant Decommissioning Funding

Company Name	Decommissioning Cost Estimates (Millions of 1997$)	Decommissioning Fund Balance at Year End 1997 (Millions of $)	Unfunded Portion (Millions of 1997 $)	Percent of Estimated Costs Currently Funded (%)
AEP	1,152	381	771	33%
Atlantic	165	82	83	50%
Baltimore G&E	571	145	426	25%
BECo	462	152	311	33%
Carolina P&L	1,094	246	849	22%
Centerior	656	182	474	28%
Central and South West	269	46	224	17%
Central Hudson G&E	78	11	67	14%
CMS Energy	903	486	417	54%
Commonwealth Edison	4,656	1,856	2,800	40%
Consolidated Edison	720	212	508	29%
Delmarva	216	47	170	22%
Detroit Edison	545	239	306	44%
Dominion Resources	1,120	569	551	51%
DQE	315	47	268	15%
Duke Power	1,391	422	969	30%
El Paso Electric	239	38	201	16%
Entergy	2,042	589	1,453	29%
Florida Progress Corp.	454	267	187	59%
FPL Group	1,500	998	502	67%
GPU	1,265	580	685	46%
Houston Industries	281	93	188	33%

IES Industries	277	78	199	28%
Illinois Power	549	63	486	11%
Kansas City Power	417	40	377	10%
Long Island Lighting Co	151	20	131	13%
Madison G&E	79	59	20	75%
MidAmerica	477	172	306	36%
Niagara Mohawk	939	216	723	23%
Northeast Utilities	1,482	503	979	34%
NU share of Yankees	606	250	356	41%
Northern States MN	981	400	581	41%
NY State G&E	112	13	99	12%
Ohio Edison	467	110	357	24%
PECO	1,500	320	1,180	21%
PG&E	1,429	1,071	358	75%
Pinnacle West	460	125	335	27%
PP&L	793	163	630	21%
PS Enterprise Group	1,029	458	571	45%
Public Service New Mexico	163	31	132	19%
Rochester G&E	427	133	294	31%
San Diego Gas and Electric	401	399	2	100%
SoCal Edison	2,100	1,400	700	67%
South Carolina Electric & Gas	271	73	198	73%
Southern Company	1,473	387	1,086	26%
Texas Utilities	675	160	515	24%
Union Electric	451	122	329	27%
Western Resources	196	44	152	22%
Wisconsin Energy	404	404	0	100%
Wisconsin Public Service	182	134	48	74%
WPL	181	112	69	62%
Total	**38,765**	**15,143**	**23,622**	**39%**

We estimate that the total unfunded decommissioning liability for units retired before the end of their operating licenses would amount to $4.1 billion, $7.1 billion, and $15.3 billion, for the high, reference, and low scenarios, respectively. These figures are in 1997 dollars, and assume that funds will continue to be collected at current annual rates. The decommissioning information relied upon here are based primarily upon data reported by utilities in their 10Ks, and nuclear units owned by public entities such as Tennessee valley Authority are excluded.

The current set of decommissioning cost estimates is, of course, subject to considerable uncertainty. The rapid rate of escalation in the estimates over the past two decades[8] suggests that further escalation is a distinct possibility, and that the unfunded liability could be much greater than the figures reported here.

Spent Nuclear Fuel Transportation and Storage Costs

The prospect of nuclear plant retirements has implications for spent fuel disposal as well. Our Nation's policy for spent nuclear fuel disposal is based upon two potentially conflicting ideas. First, the costs of disposal are to be fully paid for by the owners and generators of spent nuclear fuel through a fee paid to the DOE for nuclear kWh generated and sold. At the same time, the DOE is precluded from changing the fee retroactively. That is, the DOE can raise the fee that it charges per kWh of future generation from nuclear power plants, but it cannot go back to nuclear electricity generated in prior years if the program revenues are found to be inadequate to [illegible] The [illegible] as nuclear plant [illegible]

[illegible] will be [illegible] the DOE [illegible] to the end [illegible] last assessment [illegible] adequate.

Table 4
Funding Scenarios for High Level Nuclear Waste Disposal Program

Scenario	Revenues	Costs of Waste Disposal Program	Shortfall in 2071 (billions of 1997 $)	Necessary Fee to Cover Costs
1. [illegible] Fee Adequacy Assessment with [illegible] Interest at 2[illegible]	Nuclear generation from EIA 1994 projection, adjusted to remove cancelled TVA units	[illegible] estimated [illegible] September 1995 [illegible]	[illegible]	1.1 mills/kWh
2. DOE with Synapse Reference Nuclear Projection	Early retirement of 34 additional nuclear units (decreasing DOE's generation forecast by about [illegible])	DOE projected program costs decreased by 2.8% (recognizing 5.6% lower total nuclear generation with half of costs fixed)	$3[illegible] billion	1.2 mills/kWh
3. DOE with Synapse Low Nuclear Projection	Early retirement of 90 additional nuclear units (decreasing DOE's generation forecast by about [illegible])	DOE projected program costs decreased by 16.4 (recognizing 32.8% lower total nuclear generation with half of costs fixed)	$6[illegible] billion	1.5 mills/kWh
4. Independent Cost Assessment	Nuclear generation from EIA 1994 projection, adjusted to remove cancelled TVA units	Cost estimate from PRC's Independent Cost Assessment [illegible]	$45.9 billion	2.6 mills/kWh
5. Independent Cost Assessment with Synapse Reference Nuclear Projection	Early retirement of 34 additional nuclear units (decreasing DOE's generation forecast by about [illegible])	Independently projected program costs decreased by 2.8% recognizing 5.6% lower total nuclear generation with half of costs fixed	$46.5 billion	2.9 mills/kWh
6. Independent Cost Assessment with Synapse Low Nuclear Projection	Early retirement of 90 additional nuclear units (decreasing DOE's generation forecast by about [illegible])	Independently projected program costs decreased by [illegible]	$4[illegible] billion	4.[illegible] mills/kWh

In Table 4, we summarize six scenarios for the spent fuel disposal program cash flow. In the first case, we take the analysis of the DOE's latest fee adequacy report with one modification: the assumed real interest rate is reduced to 2.0 percent. DOE's report presents results for a range of interest rate assumptions, but appears to favor a 2.8 percent rate based on a DRI forecast. We believe that 2.8 percent is optimistic for a risk-free return, and that a figure of 2.0 is preferable for waste fund planning purposes. This first scenario shows a resulting fund shortfall of $1.9 billion (in 1997$) in the year 2071, which can be avoided by increasing the fee slightly – to 1.1 mills per kWh.

In the second scenario for the nuclear waste program, we incorporate the Synapse reference case for nuclear unit retirements. This results in a forecast of future nuclear generation (and hence revenue from the fee) that is about 10 percent lower than that assumed by the DOE. Because nearly half of the total nuclear generation from our country's fleet of nuclear units is behind us, however, the total nuclear generation (and hence the approximate total amount of nuclear waste) is reduced by only 5.6 percent. For the cost side of the program, we assume here that the disposal program costs are half fixed (unchanging with the amount of waste generated) and half variable (scaling proportionally with the amount of waste generated). The specific nature of how the program costs change with differing quantities of waste generated, transported, and stored, over different time streams is an important topic for detailed engineering analysis which remains to be undertaken. Note, however, that the decrease in program costs is likely to be much lower than the decrease in revenues, as a result of the structure of the program funding mechanism and the fact that we are at or near the mid-point in cumulative electricity production from our nation's nuclear plants. The result for the reference case scenario is a projected funding shortfall of $3.8 billion (in 1997$) in the year 2071, at the conclusion of the spent fuel program. A relatively minor adjustment to the one mill per kWh fee – to 1.2 mills per kWh – is enough to offset the shortfall, if the adjustment is made in the next few years.

A third scenario, with Synapse's low case projection of nuclear generation, shows a funding shortfall of $6.7 billion (in 1997$ in the year 2071). This can be avoided by a fee increase to 1.5 mills per kWh. Here, the adjustment to the program costs amounts to 16.4 percent, based upon the same half fixed, half variable assumption used in the prior case.

There are many reasons to believe that the current official estimates of program costs are understated. A recent Independent Cost Assessment prepared for the Nevada Agency for Nuclear Projects (PIC, 1998) found that program costs are likely to be roughly 50 percent higher than assumed by the DOE. In our fourth nuclear waste program scenario, we substitute this cost estimate for the DOE's, and find an expected shortfall of $45.9 billion (in 1997$ in 2071). This huge funding shortfall, a gross violation of the principle that the costs of the program are to be recovered from the generators of the waste in the fee charged to nuclear generation, can be avoided by increasing the fee to 2.6 mills per kWh.

In scenarios 5 and 6, we combine the Synapse nuclear plant retirement projections with the independent cost estimates for the spent fuel program. The results are funding shortfalls similar to that of scenario 4, but the necessary fee increases are larger, owing to the decreases in nuclear generation. In cases 5 and 6, the fee must be raised to 2.9 and 4.5 mills per kWh, respectively.

As the spent fuel disposal fee is increased to internalize the costs of nuclear waste, there is an important and troubling feedback effect upon fee adequacy. A higher fee will tend to cause additional nuclear unit retirements, which in turn will lead to a need to increase the fee. It is quite possible that in some scenarios this reinforcing feedback could result in a situation where increasing the fee is counterproductive. This prospect should be avoided, by making necessary adjustments to the fee in a timely manner as the need becomes apparent. Delays in implementing fee increases could make it impossible to satisfy the "full cost recovery" principle for program funding, without implementing retroactive assessments.

Further Research

The analysis described here depends upon numerous simplifying assumptions. Future research should address key issues including:

- Trends in nuclear plant operating costs and performance with age, particularly during the final years of a unit's operating license.
- The range and volatility of electricity prices in regional markets.
- Plant and company specific considerations, including plans for major equipment replacement.
- The role of potential nuclear plant license extensions.
- Tightening environmental regulations for fossil-fueled power generation.
- Feedback of nuclear retirements upon market prices for electricity.
- Relationship between total nuclear waste volume and DOE spent fuel program costs.
- Financial assumptions (i.e., the inflation rate and real interest rate) that bear upon the economics of the spent fuel disposal program.
- Feedback between nuclear waste disposal fees and the number of units that are uneconomic to operate.
- The appropriateness of Price-Anderson liability limits and nuclear insurance in a competitive electricity market.

Perhaps, the most important set of considerations for immediate attention are those that are within the control of regulators and policy-makers. As the electric utility industry is deregulated, we will have to decide whether and to what extent specific generating technologies should be subsidized. As a general principle of competition the owners of nuclear power plants should be required to bear their full costs, including accident risk, nuclear waste disposal, and the costs of dismantling the plants. The public policy implications are far-reaching, particularly through time. The appropriate government agencies should act now to anticipate future problems, and to create frameworks to internalize the full costs of nuclear power in market prices. A nearsighted approach to these issues will lead to situations in which political conflicts over large public subsidies will be inevitable and irreconcilable.

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2 Out of a total of 102 currently operating nuclear units.

3 The assumption here is that sunk capital investments, whether recovered from customers or not, are largely irrelevant to the decision to continue to operate the units. The logic of this is the sunk costs cannot be avoided. Even in the event of a bankruptcy resulting from failure to recover sunk investment, the bankruptcy court would likely require the continued operation of economical units in order to maximize revenues for creditors. Unfortunately, under economic regulation (and to some extent under transitional stranded cost recovery provisions) a utility may have an incentive to operate an uneconomical unit in order to provide for cost recovery from customers.

4 As a practical matter, the analysis works backward from the last year of a unit's operating license in order to ensure that a unit with near term net annual benefits but long term net annual losses can be retired later in the unit's operating license period, in order to maximize benefits.

5 Electricity market prices between 1996 and 2005 were interpolated between the "near-term" and "long-term" prices.

6 We have allowed retirements on a schedule based upon EIA's summary of state electric utility deregulation activity: 1999 for states with restructuring legislation enacted, 2000 for states with a comprehensive regulatory order, 2001 for states with legislation or orders pending, 2002 for states with ongoing investigations, and 2003 for states with no significant activity (see the EIA's web site at "www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html").

7 Data was not available for public power owners of nuclear plants and so these are omitted from the Table. The most significant omission is the Tennessee Valley Authority, which operates several nuclear plants and apparently does not have external trust funds for decommissioning.

8 Nuclear decommissioning cost estimates escalated at an average annual rate of about 10 percent real since 1977 (Biewald 1997).

9 The estimate is $28 billion on a forward basis in 1996 dollars for the civilian portion of the program. Source: DOE/RW-0490, "Nuclear Waste Fund Fee Adequacy: An Assessment, October, 1996.

10 The estimate is $43billion on a forward basis n 1996 dollars for the civilian portion of the program. Source (Planning Information Corporation, 1998).

Exhibit O

Footnote 17

being offered the low price Monday.
"I don't know if my wife will let me do that," he

Although he's disgusted with the prices, Mohr remains optimistic abou

Utilities may operate nuclear plants jointly

Partners in 3 states assess efficiencies

By George C. Ford
Gazette financial editor

Alliant Utilities and three other Midwest utilities are exploring the advantages of forming a single organization to service or possibly operate seven nuclear power plants in the region.

Alliant Utilities, Northern States Power Co., Wisconsin Electric Power Co. and Wisconsin Public Service Co. operate seven nuclear power plants at five sites in Iowa, Minnesota and Wisconsin with total generation exceeding 3,650 megawatts. Alliant Utilities operates the Duane Arnold Energy Center in Palo, a 535-megawatt plant it owns jointly with Central Iowa Power Cooperative and Corn Belt Power Cooperative.

An alliance to share information and best practices was formed in August by Alliant Utilities, NSP, Wisconsin Electric and Wisconsin Public Service. Bruce Lacy, business manager at the Duane Arnold Energy Center, said the utilities plan to take advantage of the combined skills of their employees to improve plant performance and reliability, strengthen operational efficiency and maintain high safety levels.

"It's an opportunity for us to see the quality of interaction between the employees of the four companies," said Lacy. "It's an important factor in any decision that we make about future cooperative efforts."

After reviewing the results of the current alliance, the companies hope to move fairly quickly regarding any future venture.

"We would like to make some kind of decision as to what our initial step is by sometime early next year," said Lacy. "We would need to set up some type of operational structure to form a service company, an operating company or a generating company.

"A service company appears the easiest to set up. An operating company is more complex and a generating company is the most complex and, consequently, likely to be farthest off on anyone's planning horizon."

Duane Arnold Energy Center employs about 600. Combining the employees at all seven plants would create an organization with about 2,500 workers.

"We would provide an opportunity for our staff to grow and develop their talents in a much larger organization," said Lacy. "We would be able to develop a lot of expertise internally that we currently purchase from contractors."

Alliant's plans for generator in Wisconsin draw opposition

MADISON, Wis. (AP) — Plans for constructing an electricity generator in a rural community have the support of the Wisconsin Public Service Commission and the opposition of a group that threatens to go to court.

The PSC voted 3-0 Tuesday in favor of the plant in the eastern Dane County

generation required by the state.

PSC staff said Monday it favored the Dane County site because of its access to transmission lines and natural gas lines.

It could provide current to southern and eastern Wisconsin and to Illinois and Iowa.

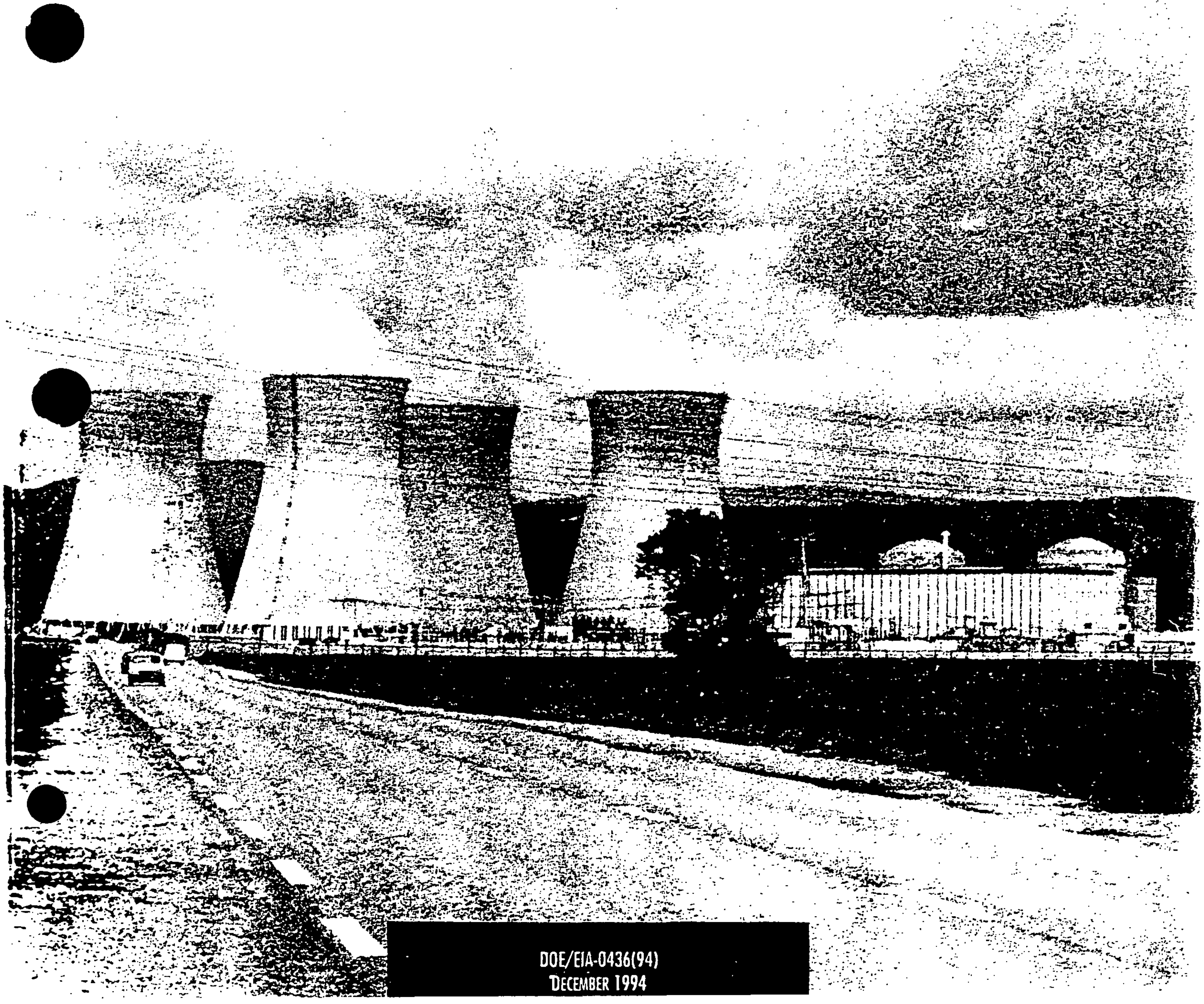
Exhibit P

EIA

WORLD NUCLEAR OUTLOOK

1994

Footnote 18



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Executive Summary

Worldwide Status of Nuclear Power

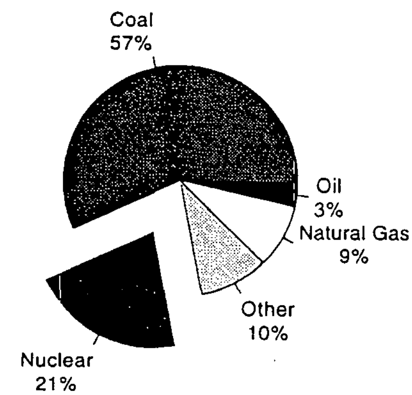
As we approach the 21st century, the future of commercial nuclear power remains uncertain throughout most of the world. The uncertainty is largely attributable to public concerns about nuclear safety which have led to extensive and costly safeguards. What was expected to be a cheap source of electricity nearly 20 years ago, has become more costly.

The current state of the industry is that, as of December 31, 1993, there were 430 nuclear reactors operating throughout the world. During the year, nine units were connected to the electrical grid, while three were retired. Japan led all countries with four nuclear units starting operation, whereas Canada, China, France, Russia and the United States each had one unit added to the list of operable units.

The 430 reactors spread throughout 30 countries had a total capacity of 338.1 net gigawatts-electric (GWe), accounting for over one-quarter of the electricity generation within the countries. Nuclear-generated electricity was 2,093 net terawatthours (TWh), a 3.3-percent increase over the 2,027 TWh in 1992.[1,2] A total of 610 TWh of electricity was produced from 109 units in the United States, a decrease of 9 TWh from the record 1992 generation of 619. The 610 TWh accounted for 21 percent of the electricity produced by utilities in the United States (Figure ES1).

As of December 31, 1993, 94 reactors were under construction, with a total capacity of 81.2 GWe. The majority, however, were less than 26 percent complete (52 out of 94). The countries with major nuclear power programs continued with their nuclear commitment while other countries continued at a slower pace or stopped further expansion. The United States in particular, as well as most of the Western European countries, has few, if any, plants in the construction pipeline. Conversely, Japan's nuclear construction program far surpasses that of any other country in the world with 19 units under construction, totaling 20.1 GWe of capacity. France, India, and South Korea, which are also considered to have aggressive nuclear construction programs, had a combined total of 23 units under construction, with a total capacity of 19.5 GWe.

Figure ES1. Percent Net U.S. Utility Electricity Generation by Fuel Type, 1993



Note: Other includes hydro, geothermal, wood, waste, wind, photovoltaic, and solar thermal energy sources connected to electric utility distribution systems.

Source: Energy Information Administration, *Monthly Energy Review July 1994*, DOE/EIA-0035(44/07).

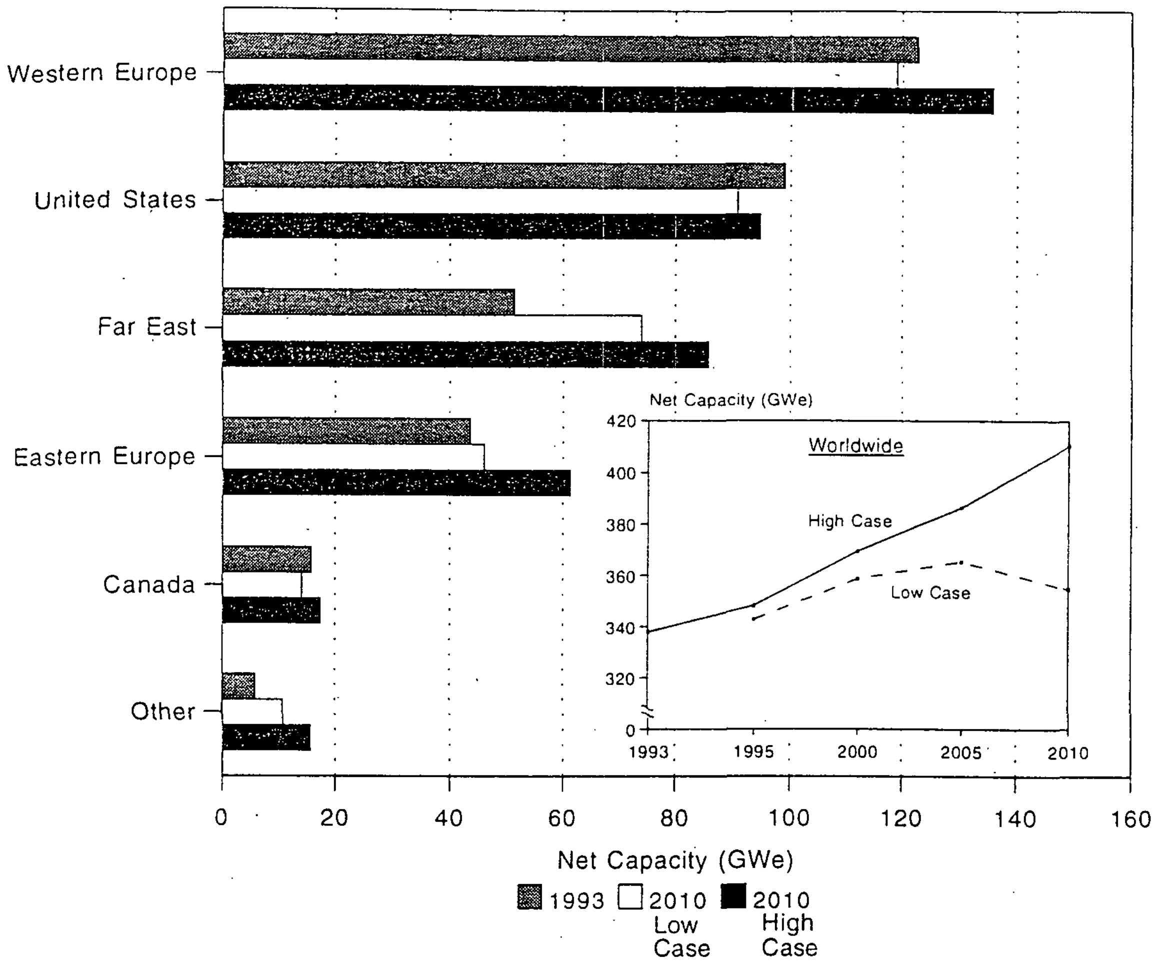
Worldwide Nuclear Capacity Projections

Nuclear capacity is projected to increase slightly from 338.1 GWe in 1993 to 354.7 GWe in the Low Case and to 410.3 GWe in the High Case by 2010 (Figure ES2), representing an annual growth rate between 0.3 and 1.1 percent. The Low Case capacity projection reflects the fact that a nuclear moratorium or a slowdown in construction is in effect in Belgium, Bulgaria, Canada, Cuba, Finland, Germany, Italy, Lithuania, Netherlands, Spain, Sweden, Switzerland, and the United Kingdom. In addition, the nuclear construction program in Russia has been slowed as the country implements a program to improve the safety of its RBMK reactors. The Ukrainian parliament has recently lifted its moratorium on commissioning new nuclear units and, in addition, reversed its earlier decision to permanently shut down

[1]Revised from last year's published generation of 2,023.1 TWh. See Energy Information Administration, *World Nuclear Capacity and Fuel Cycle Requirements 1993*, DOE/EIA-0436(93) (Washington, DC, November 1993).

[2]All capacity ratings and electricity generation in this report represent net values.

Figure ES2. 1993 World Nuclear Capacity and Projected Capacity for 2010



Sources: **1993**—United States, Nuclear Regulatory Commission, "Information Digest, 1994 Edition" (NUREG-0380) (May 1994): Foreign, International Atomic Energy Agency (IAEA), "Nuclear Power Reactors in the World" (Vienna, Austria, April 1994). **Projections**—Energy Information Administration, "World Integrated Nuclear Evaluation System" (WINES April 1994 run). The remaining projections are based on a critical assessment of detailed country-specific nuclear power plans. Information used in developing the projections for the countries of Eastern Europe, the People's Republic of China, Cuba, and North Korea was obtained from the International Atomic Energy Agency's 1994 Consultancy Meeting on International Nuclear Capacity Forecasting.

the Chernobyl 1 and 3 units in 1993. Worldwide, the High Case capacity projection is about 17 GWe lower than last year's High Case projection. The decrease is largely the result of lower projections for Canada and the United States. Because of Canada's large capacity reserve margins and falling electricity demand, Ontario Hydro, the country's largest utility, is currently downsizing its present capacity and has, therefore, decided on early shutdowns for the Bruce 1 and 2 units. With the scheduled closing of the Bruce 1 and 2 units, the Low Case projection for Canada shows a decline from 15.8 GWe total nuclear capacity in 1993 to 14.1 GWe in 2010.

The United States nuclear capacity is projected to decline slightly from 99.0 GWe in 1993 to 90.7 GWe in 2010 in the Low Case and to 94.7 GWe in the High Case. Only four U.S. units (Watts Bar 1 and 2 and Bellefonte 1 and 2) are actively under construction. All four are owned by Tennessee Valley Authority (TVA). Under the provisions of the Energy Policy Act of 1992, however, TVA is required to use the Integrated Resource Planning (IRP) process to determine whether a plant will be completed. The Watts Bar 1 nuclear unit is exempt from the IRP and is expected to receive its full-power license in 1995. By the end of 1995, TVA officials will decide whether to continue work on the remaining units.

World Demand for Uranium and Enrichment Services

Uranium usage from 1994 through 2010 for commercial nuclear reactors throughout the world is projected to be between 2.5 and 2.7 billion pounds. On average, worldwide use of uranium from 1994 through 2010 will be between 144 and 155 million pounds per year. Some uranium may be displaced by the use of plutonium in mixed-oxide fuel, but this will not significantly affect the use of uranium. Currently, four countries in Western Europe are using mixed-oxide fuel; Japan is expected to start using mixed-oxide fuel in a demonstration program in 1995.

Requirements for enrichment services worldwide from 1994 through 2010 are projected to be between 527 and 569 million separative work units (SWU). Annual SWU requirements will vary between 27 and 40 million per year. The current worldwide enrichment capacity of 46.7 million SWU is more than enough to meet the expected demand.

Uranium Market Developments

For more than a decade, the world has had an oversupply of uranium, a trend that is likely to persist over the next several years. As a result, the average Nuexco unrestricted spot-market price declined to $7.12 per pound U_3O_8 in 1993, compared to $7.95 per pound in 1992. A two-tiered market developed in the United States following the suspension agreements that restrict imports from the republics of the Former Soviet Union (FSU). During 1993, these agreements produced a spot-market price in the United States that was $2 to $3 per pound higher for non-FSU uranium than for FSU uranium.

Two prevailing factors led to declining uranium prices in the West since the early 1980's. For several years, new uranium production had to compete with the liquidation of excess producer and utility inventories that had built up after delays and cancellations of reactor construction programs. More recently, exports of uranium from the Former Soviet Union and, to a lesser extent, from China contributed to the weakness in uranium prices.

Over the forecast period, spot-market prices are likely to rise modestly in the near term to reflect the continuing effect on the uranium market of the suspension agreements and the amendment to the agreement with Russia. Beyond the near term, as the effect of inventory drawdowns diminishes, new uranium production is likely to be undertaken to meet demand. A gradual price increase is projected. The spot price (in constant 1993 dollars) is expected to be slightly higher than $13 per pound U_3O_8 by 2005.

The U.S. uranium mining and milling industry developed nonconventional mining methods such as uranium recovery by *in situ* leaching in the 1950's and 1960's. Since 1980, nonconventional mining methods have contributed a significant share to domestic production. In 1993, *in situ* leaching and recovery of uranium as a byproduct of phosphate mining accounted for almost all of the 3.1 million pounds of U.S. uranium production.

Projections of uranium production reflect a higher cost for domestic operations than for those of other countries. Consequently, a large share of domestic demand is likely to be met by imports. The modest but continuing increase projected for uranium prices should induce annual domestic production to rise gradually to 5.2 million pounds in 2000. As the price trajectory continues its upward trend, domestic uranium production is expected to reach 7.7 million pounds by 2004 but decline slightly to 7.4 million pounds in 2005.

Commercial Spent Fuel

Management of spent fuel from nuclear reactors is important for all countries with nuclear power programs. Concerns about how spent fuel will be stored and ultimately disposed of will continue to grow as the volume of discharges increases. Worldwide, total spent fuel discharges from 1994 through 2010 are projected to range from 169 thousand to 176 thousand metric tons of uranium (MTU) worldwide. Most countries have chosen reprocessing as the method for managing their spent fuel, although many countries have deferred the decision while different approaches are evaluated. The United States and Canada are currently the only countries relying entirely on direct disposal of spent fuel. The United States is currently evaluating Yucca Mountain, Nevada, as a potential site for permanent disposal of commercial spent fuel and other high-level radioactive waste. By the end of 1993, commercial nuclear reactors in the United States had discharged approximately 28.0 thousand MTU of spent fuel. The total is expected to reach 62.5 thousand MTU by 2010.

Exhibit Q

NO Title

OIL NATURAL GAS ELECTRICITY PROFILE

May 1998

Germany

Germany is the world's fifth largest energy consumer. Since it has limited indigenous energy resources (except for coal), Germany imports large amounts of oil and gas. Although the country is a major coal producer, on balance it is a net coal importer.

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RECENT DEVELOPMENTS

Germany, with the world's third-largest economy, has been attempting to achieve the objectives required for entry into the European Economic and Monetary Union (EMU). This goal has been complicated in recent years by record post-war unemployment and slow economic growth. Germany's government has pursued a tight fiscal policy in an effort to reduce the deficit to 3% of Gross Domestic Product (GDP) as required for the EMU, but further, politically contentious (particularly in a general election year), cuts in Germany's generous social security system and other areas may be necessary. In recent months, economic growth appears to have picked up somewhat, driven largely by robust exports and low interest rates. Weak consumer demand and investment, on the other hand, have acted to slow economic growth, particularly in eastern Germany.

In early April 1998, Germany's constitutional court cleared the way for German membership in the EMU, and on April 23, 1998, Germany's parliament (the Bundestag) voted overwhelmingly in favor of joining the 11-country European single currency zone. The EMU is set to begin the process of creating a single European currency (the Euro) on January 1, 1999. Individual member-state currencies, including the German deutsche mark (DM), are set to be phased out by July 1, 2002.

In recent years business and political leaders have become increasingly concerned about Germany's apparent decline in attractiveness as a business location. They cite the increasing preference of German companies to locate new manufacturing facilities - long the strength of the postwar economy - in foreign countries, including the United States, rather than in Germany, partly in order to be nearer to export markets and partly to avoid Germany's high taxes and labor costs, restrictive regulations, and other problems.

Meanwhile, Germany faces the serious challenge of reintegrating its eastern area after 45 years of communist rule. Despite some progress toward this goal, the eastern states likely will continue to rely on the annual subsidy of approximately $100 billion from the western states into the next century. This assistance helped the East to average nearly 8% annual economic growth in 1992-95, even though the overall German economy averaged less than 2% growth. Growth in the east, however, averaged only slightly more than 2% in 1996 and 1997, with unemployment a particularly severe problem (and much worse than in western Germany). In January 1998, for instance, unemployment in the East reached 21.1%, more than double the 10.5% in the West. This has exacerbated social problems and contributed to an increase in neo-Nazi activity, especially in the eastern states.

The German economy is expected by most analysts to experience an accelerating export-led economic recovery in 1998, with eastern states finally starting to see gains. Overall, Germany's economy is expected to grow at a 2.5%-3% rate in 1998, significantly higher than the average 1.5% rate during the 1993-1997 period. Despite this increased growth rate, progress towards reducing unemployment likely will remain slow, while inflation stays subdued. A 1% increase (from 15% to 16%) in the value-added tax (VAT), effective April 1, 1998, will add a one-time boost to the inflation rate. Meanwhile, Germany's trade balance is expected to move further into surplus in 1998 (from a near-record $70 billion in 1997). One possible threat to faster German GDP growth in 1998 is the Asian economic crisis and its potential impact on exports.

ENERGY

Germany is the world's fifth largest energy consumer -- 14.4 quadrillion Btu, or quads, in 1996. In comparison, Germany produced only 5.5 quads of energy in 1996 (overwhelmingly coal and nuclear power). This made Germany a net energy importer of nearly 9 quads worth of energy in 1996. Indications are that energy demand declined slightly in 1997, due largely to mild weather.

Germany has high domestic energy prices, particularly in electricity and coal, due largely to a policy which traditionally has focused more on supply security and the promotion of domestic fuels rather than on keeping consumer prices low. Germany's gas sector has effectively been a monopoly, its electricity sector an oligopoly of private companies closely tied in with local and municipal governments, and its coal sector a highly-subsidized and protected industry. The government is highly influential with energy suppliers in gaining compliance with national policy objectives.

Following reunification of the country in 1990, the major task of German energy policy was to merge successfully the radically different energy sectors of the "two Germanys", East and West. West Germany had a

diversified and mainly privately-owned system of energy supply with a high standard of energy efficiency and a deep commitment to environmental protection. In contrast, East Germany's energy sector was highly centralized, predominantly state-owned, and mainly dependent upon relatively "dirty" lignite (brown coal), as its primary fuel. To date, a great deal of progress has been made in conforming the former East Germany's energy sector to the standards of the West in the areas of privatization and environmental regulation.

On April 29, 1998, new energy legislation designed to introduce competition to the traditionally closed electricity and natural gas sectors came into force. The law originally was to have taken effect at the beginning of 1998, but a constitutional challenge by the opposition Social Democrat Party delayed it until the end of April. The law will, among other things, abolish utilities' demarcated monopoly supply areas and create a framework for third-party access to electricity grids and gas pipelines. Lignite mining in eastern Germany are to be protected from competition through as late as 2005. Renewables and cogeneration plants are given "special significance" under the new law.

OIL

Germany consumes about 2.9 million barrels per day (bbl/d) of oil, nearly all of which it imports, making Germany the third-largest oil importer in the world. In 1997, German oil imports came primarily from (in decreasing order of magnitude): Russia; Norway; Britain; and OPEC (Libya, Saudi Arabia, Nigeria, Algeria). OPEC accounts for about 30% of Germany's oil imports. Germany produces around 59,000 bbl/d of crude oil, much of which comes from the North Sea.

Germans pay nearly three times the price for gasoline as in the United States. This is almost totally the result of taxes. In Germany, about three-quarters of the price of gasoline is made up of taxes, compared to around one-third in the United States. In March 1998, the German Green Party announced a proposal to raise prices far higher by tripling gasoline taxes. In April, the ruling Christian Democratic Union's parliamentary leader unveiled his own plan for higher gasoline taxes throughout the European Community as a way to replace lost revenues resulting from lower income taxes.

Venezuela's state oil company PdVSA stated in mid-March 1998 that it wanted to increase by half (to 150,000 bbl/d) the supply of its own crude oil to its German refining venture Ruhr Oel. Ruhr Oel is a 50/50 joint venture between PdVSA and German company Veba Oel AG. Overall, Venezuela holds stakes in four German oil refineries through Ruhr Oel, which has been processing around 200,000 bbl/d of oil (100,000 bbl/d each from Russia and Venezuela).

Under a new law which took effect on April 15, 1998, Germany's strategic oil inventory agency EBV now is required to hold a 90-day emergency stockpile of oil, up from 80 days previously. EBV has 5 1/2 months to complete this increase, and therefore plans to buy around 40,000 bbl/d of oil over the summer months. The strategic oil which EBV manages is in addition to the German government's crude reserve of around 5 million metric tons (37 million barrels). In early March 1998, tentative plans to sell Germany's crude reserve were dropped, with no new date set for the sale. Originally, the oil was to have been sold off by the end of 1998.

NATURAL GAS

Germany produced 0.78 trillion cubic feet (Tcf) of natural gas in 1996 on reserves of 12.1 Tcf. A possible boost in output could occur in 2000 if Wintershall brings its 450 billion-cubic-foot A/6-B/4 North Sea (German sector) field online. Germany consumed 3.7 Tcf of gas in 1996, around 80% of which it imported, mainly from Russia, the Netherlands, and Norway.

Currently, although there are nominally 20 firms in the gas distribution business, Ruhrgas is by far Germany's dominant natural gas transmission company, with a controlling interest in the entire German domestic pipeline network and a 70% share of the German natural gas market. Ruhrgas also is the world's largest gas importer. Due to the monopolistic structure of the German natural gas sector, German industry pays among the highest prices for gas in Western Europe. On the other hand, the German gas monopoly has promoted the development of an extensive gas infrastructure in the country, and has helped make gas the preferred fuel in the household heating market.

Several natural gas pipeline projects are underway in Germany. The three most important are: 1) Trans

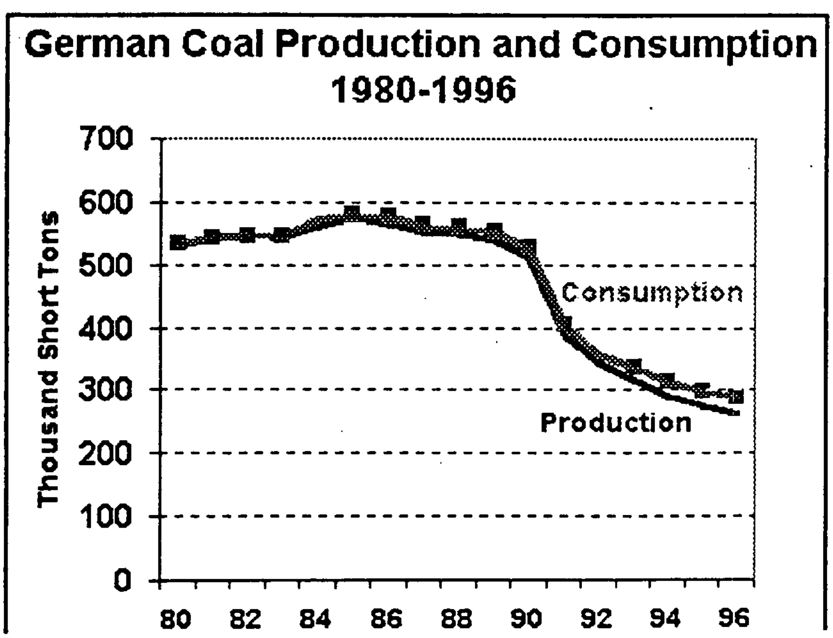
Europa Naturgas Pipeline (a Ruhrgas/Snam joint venture); 2) Wedel Line (Bielefeld to Aachen); and 3) the Tirol-Bayern pipeline from Schnaitsee to the Austrian border. Trans Europa Naturgas Pipeline will expand an existing system that stretches from the German-Dutch border near Aachen to the Swiss-German border at Schwoerstadt, with a line that will run parallel to the existing line. Rising demand in southern Germany and Switzerland has created the need for additional capacity, which should be completed by 2000. The first portion of the 50-mile Wedel line has been completed, connecting Bielefeld to Soest. Construction of the second portion (136 miles from Soest to Aachen) is scheduled for completion by the end of 1998. The Wedel line will allow German Wingas to supply gas to the Ruhr region, currently dominated by Ruhrgas. No development appears to have taken place on the Tirol-Bayern pipeline.

As of early March 1998, French gas company Gaz de France (GdF), along with Berlin electric utility Bewag, was slated to assume a 51.2% stake in Berlin's gas distribution company, Gasag. Gasag had been owned by the government of Berlin. GdF and Bewag aim to develop Gasag in the areas of cogeneration, energy efficiency, and underground storage.

Meanwhile, gas marketer Wingas (Wintershall and Russia's Gazprom) is set to complete expansion work on the Rehden gas storage park, Germany's largest, by May 1999. Rehden is located in northwestern Germany along the main north-south Midal trunk line of a gas transit network which Wingas is building as part of its strategy to secure a 15% share of the German market during the first decade of the next century.

COAL

Germany has coal reserves of 74.2 billion short tons (bst), of which 36% is hard coal (anthracite and bituminous), while 64% is soft coal (lignite and subbituminous). Germany's hard coal production, which is highly subsidized, declined from 88 million short tons (mmst) in 1989 to 62 mmst in 1995. Overall coal production, including lignite (produced largely in eastern Germany), fell sharply, from 540.7 mmst in 1989 to 264.3 mmst in 1996. The sharp decline in Germany's lignite output followed the conversion from lignite-based town gas (or "coal gas") to natural gas in the eastern German states following reunification in 1990. In addition, natural gas was substituted for lignite in home heating. Finally, the collapse of industrial activity in eastern Germany was a major factor in the decline in lignite demand.



With coal production declining, the country is emerging as a significant coal importer. Coal imports rose a reported 20% in 1997. Main suppliers in 1996 were South Africa and Poland (followed by Colombia, the Czech Republic, Australia, Venezuela, and Canada), with steam coal accounting for 70%, coking coal for 15%, and coke for 15% of total coal imports. Metallurgical coal demand traditionally has been satisfied mainly by domestic production, but imports are expected to increase in coming years.

In 1996, German power plants

consumed over 40 million metric tons (mmt) of hard coal and 170 mmt of lignite. Overall, coal accounted for over half of the inputs to German power plants in 1996. Around 90% of German lignite production is burned by German power plants. German coal consumption could grow as new coal-fired plants are brought online over the next several years. Coal sales to electric plants and steel factories in Germany are generally ensured by means of long-term agreements.

Historically, coal production in Germany has been heavily subsidized despite environmental damage associated with its mining and burning. Subsidies help protect employment in the coal mining sector, since German hard coal in particular is uncompetitive with imports due to high recovery costs (hard coal is located at great depths in Germany). In December 1994, Germany's constitutional court ruled that the 7.5% "Kohlepfennig" tax on electricity was unconstitutional and gave the government until the end of 1995 to phase it out. This tax, combined with import quotas and government-imposed mandates on electricity generators to buy a set amount of higher-cost domestic coal, had made German electricity the most expensive in Europe. Beginning in 1996, coal subsidies were financed directly by payments from federal and state budgets.

In March 1997, the German government, the mining industry, and the unions reached an agreement on the future structure of subsidies to the German hard coal industry. In summary, subsidies to the industry are to be reduced from over DM10 billion ($6.6 billion) in 1997 to DM5.5 billion ($3.1 billion) by 2005, resulting in an estimated decline in production to 33 mmst. The agreement calls for closure of 7-8 of Germany's 19 hard coal mines, resulting in an estimated decline in employment from 76,000 miners in 1997 to 52,000 by 2005. In eastern Germany, lignite producers are to be protected from competition through 2002.

A single, national, deep mine coal producing company is expected to be formed in 1998, assuming that Ruhrkohle's pending acquisitions of Saarbergwerke and Preussag Anthrazit go through. The German government owns 74% of Saarbergwerke, which has been a money-loser. Saarbergwerke has agreed to shut one of its three mines (Goettelborn/Reden) by 2005.

The United Kingdom and Germany are involved in a trade dispute of German coal subisidies. In mid-March 1998, Germany's Economics Minister Guenter Rexrodt dismissed British protests over Germany's subsidized coal as "simply absurd." The U.K. government announced in March that it intended to file a formal complaint with the European Commission over Germany's coal subsidies. The embattled British coal industry argues that Germany heavily, and unfairly, subsidizes its coal. Britain's latest action comes after British company Celtic Energy had settled a lawsuit against Germany's Preussag Anthrazit GmbH. Celtic had claimed that the German firm was selling its coal for less than its production cost ("dumping"). The company withdrew its suit after Preussig Anthrazit agreed, among other things, to stay out of Celtic's market. The British government is pressing ahead, however, with the aim of opening up Germany's electric market to British coal imports. The European Commission is expected to rule in May 1998 on the legality of German subsidies.

ELECTRICITY

Germany generated 515 billion kilowatthours (bkwh) of electricity on 112 gigawatts (GW) of capacity in 1996. Of Germany's total generation, about 61% came from coal-fired plants, 30% from nuclear reactors, 4% from natural gas stations, 3.5% from hydroelectricity, 1% from oil-fired plants, and 0.5% from solar, wind, and other renewable sources. Nearly 5.5 GW of new power station capacity is expected to come online in Germany between 1998 and 2002. Of this new capacity, 58% will be fired by lignite, with 11% natural gas-fired, 14% accounted for by pumped storage, and 7% from various other fuels. Germany also has firm plans to close 3.3 GW of generating capacity by 2002.

Germany's electric power sector is divided up among nine supra-regional monopolies at the top, with exclusive rights over high tension transmission facilities within their operating areas. At the local level, there are hundred of municipally-controlled power distributors. City and state governments (but not the federal government) have direct financial interests in the electric sector through concession agreements and in many cases outright ownership of local and regional distribution organizations. In between the supra-regional monopolies and the local distributors are 70 or so regional distributors of electricity.

The traditionally close relationship between local and state governments and their power utilities has allowed the utilities to operate essentially on a "cost-plus" basis. Tariffs on electricity also have been a major source of revenues for local governments. Historically, foreign suppliers of power plant equipment and services have been totally excluded from the German market. Whether or not this situation changes is largely dependent on efforts by the European Union to open utility procurement to competition.

Nuclear Power

Currently Germany ranks fourth worldwide in installed nuclear capacity, behind the United States, France, and Japan. In 1996, Germany's 20 nuclear units, with an installed capacity of 22.3 GW, provided 153.5 TWh of electricity, equivalent to a nuclear share of about 30%. Germany's nuclear output set another record in 1997 following a record year in 1996. Overall, nuclear power output increased 5.4% in 1997. The increase in output was largely the result of a high level of capacity utilization during the year. The U.S. Energy Information Administration (EIA) projects that Germany's total nuclear generating capacity will decline to 18.9 GW by 2015.

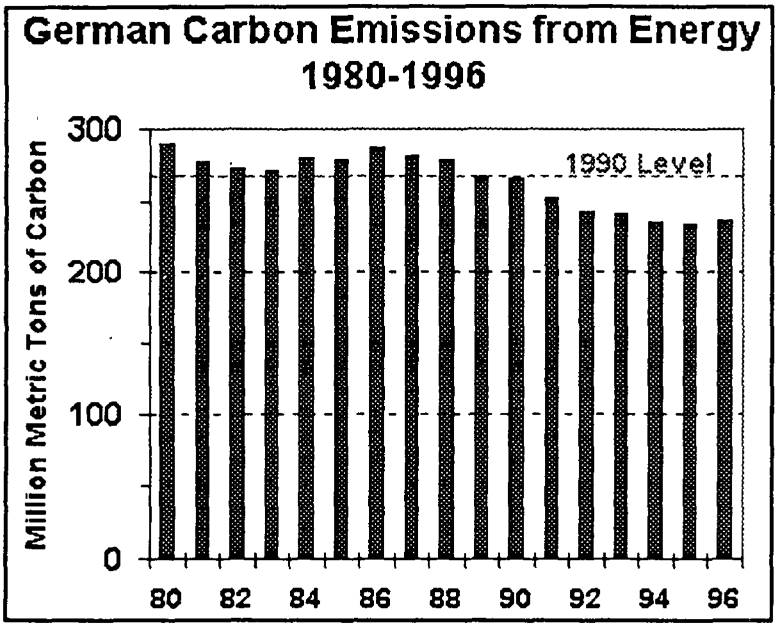
In December 1997, the German legislature passed legislation amending Germany's "Atomic Law." The amendments are intended to keep open the option to build new nuclear power plants, to ensure safe operation of existing nuclear reactors, to extend the license of the Morsleben nuclear waste facility to 2005, and to help ensure further development of the joint Franco-German European Pressurized Reactor (EPR) project.

The European Pressurized Reactor (EPR) is a joint project launched in 1989 by German electrical engineering company Siemens and French nuclear power plant builder Framatome. The purpose of EPR is to replace the current way of producing nuclear power with a new, more advanced method. To date, however, the project remains on the drawing board. Part of the problem is lack of demand for new baseload generating capacity in either Germany or France for at least 10 years. Another problem is that natural-gas fired power is cheaper than EPR-generated electricity.

Renewables

Under Germany's present Electricity Feed Law (EFL), utilities must accept renewables from independent power producers (IPPs). The utilities are obligated to pay the IPPs a minimum price of 90% of their average electricity rate for wind and photovoltaic energy (about 10 cents per kilowatthour), and 70% for energy from water, biomass, or biogas. The Christian Democrats-CSU party proposed to reduce the minimum required level for wind power fed into utility grids in an effort to ease the burden placed on utilities to use renewables. However, strong public support for the EFL has kept the government from making any changes thus far.

Individual German municipalities also are developing alternative energy sources. In Berlin, the Energie 2000 program aims to increase solar power use. City officials and the area's power firm, Bewag AG, are investing $22.5 million between 1997 and 2000 to support solar energy projects, and 44 potential solar installation sites already have been identified. Meanwhile, Germany plans to build two major plants to manufacture solar energy collectors, and aims to build sufficient capacity to meet one-third of world solar technology demand.



The growth rate of wind power has accelerated in recent years, partly as a result of the EFL. Over the past 10 years, more than 5,000 modern electric-generating windmills have been installed, mainly along the windy North Sea coast. As many as half of these windmills are owned by farmers. As of early 1998, the total capacity of wind power reportedly reached 2 GW, making Germany the largest producer of wind energy in the world (ahead of the United States). In one region (Schleswig Holstein), 10% of electricity now is generated from the wind.

ENVIRONMENT/CARBON EMISSIONS

In 1996, Germany emitted 237.9 million metric tons of carbon from the consumption of fossil fuels. Germany ranks third in total carbon emissions within the G-7, after the United States and Japan. Germany signed the Framework Convention on Climate Change in Rio de Janeiro in June 1992 and ratified it on December 9, 1993. Signers of the agreement pledged to stabilize per capita CO2 emissions in the year 2000 and beyond at 1990 levels. Under the Kyoto Protocol of December, 1997, Germany would have to go even further by reducing carbon emissions 8% by 2008-2012. This will be made more achievable given the sharp drop in total German carbon emissions since 1990, due mainly to decreased consumption of energy overall (and in particular lignite) in the former East Germany.

COUNTRY OVERVIEW

President: Roman Herzog (since 1994; next elections 1999)
Chancellor: Helmut Kohl (since 1982; next elections 9/27/98)
Independence: January 18, 1871 (reunification of West and
East Germany took place on October 3, 1990) Population (7/97 Estimate): 82 million (growth rate 0%)
Location/Size: Central Europe, bordering the Baltic Sea and the North Sea, between the Netherlands and Poland, south of Denmark/137,821 square miles (slightly smaller than Montana)
Major Cities: Berlin (national capital since 10/3/90; Bonn remains the Seat of Government), Hamburg, Munich, Cologne, Frankfurt, Essen, Dortmund, Stuttgart
Language: German
Ethnic Groups: German 91.5%, Turkish 2.4%, Italians 0.7%, Greeks 0.4%, Poles 0.4%, other 4.6% (made up largely of people fleeing the war in the former Yugoslavia)
Religions: Protestant 38%, Roman Catholic 34%, Muslim 1.7%, unaffiliated or other 26.3%
Defense (8/96): Army (252,800), Navy (28,500), Air Force (77,100), NATO forces in Germany (123,550)

ECONOMIC OVERVIEW

Finance Minister: Theodor Waigel
Currency: Deutsche Mark (DM)
Exchange Rate (4/22/98): US$1 =1.8 DM
Gross Domestic Product (GDP in 1990 $U.S.) (1997E): $1.86 trillion
Real GDP Growth Rate (1997E): 2.2% (1998E): 2.5%-3%
Inflation Rate (consumer prices) (1997E): 1.8% (1998E):1.7%-2.2%
Unemployment Rate (1997E): 11.4% (1998E): 11.2%
Current Account Balance (1997E): $2.1 billion
Major Trading Partners: EU (France, Netherlands, Italy, U.K., Belgium/Luxembourg), Eastern Europe, other Western European countries, United States,
Merchandise Exports (1997E): $506 billion
Merchandise Imports (1997E): $436 billion
Merchandise Trade Surplus (1997E): $70 billion
Major Export Products: Manufactures 88.2% (including machines and machine tools, chemicals, motor vehicles, iron and steel products), agricultural products 5.0%, raw materials 2.3%, fuels 1.0%, other 3.5%
Major Import Products: Manufactures 74.2%, agricultural products 9.9%, fuels 6.4%, raw materials 5.9%, other 3.6%

ENERGY OVERVIEW

Minister of Interior: Manfred Kanther
Proven Oil Reserves (1/1/98): 410.5 million barrels
Oil Production (1997E): 134,000 barrels per day (bbl/d), of which 60,000 bbl/d is crude oil
Oil Consumption (1997E): 2.9 million bbl/d
Net Oil Imports (1997E): 2.8 million bbl/d
Crude Oil Refining Capacity (1/1/98): 2.2 million bbl/d
Major Crude Oil Import Sources (1997): Russia, Norway, United Kingdom, Libya, Saudi Arabia, Nigeria, Algeria
Natural Gas Reserves (1/1/98): 12.1 trillion cubic feet (Tcf)
Natural Gas Production (1996E): 0.78 Tcf
Natural Gas Consumption (1996E): 3.67 Tcf
Coal Reserves (12/31/93E): 74.2 billion short tons
Coal Production (1996E): 264.3 million short tons (Mmst)
Coal Consumption (1996E): 289.8 Mmst
Net Coal Imports (1996E): 25.5 Mmst
Electric Generation Capacity (1/1/96): 112 gigawatts
Electricity Production (1996E): 515 billion kilowatthours (thermal 66%; nuclear 30%; hydro 3.5%; other 0.5%)

ENVIRONMENT OVERVIEW

Minister of Environment, Protection of Nature and Reactor Safety: Dr. Angela Merkel
Total Energy Consumption (1996E): 14.4 quadrillion Btu
Energy Consumption per Capita (1996E): 176.3 million Btu (vs. 351.9 million Btu in the U.S.)
Energy Consumption per $1987 of GDP (1996E): 9.5 thousand Btu (vs. 16.7 thousand Btu in U.S.)
Energy-related Carbon Emissions (1996E): 237.9 million metric tons (3.9% of world carbon emissions)
Carbon Emissions per Capita (1996E): 2.9 metric tons (vs. 5.5 metric tons in the U.S.)
Carbon Emissions per thousand $1987 of GDP (1996E): 0.16 metric tons (vs. 0.26 metric tons in U.S.)

Major Environmental Issues: Emissions from coal-burning utilities and industries and lead emissions from vehicle exhausts (the result of continued use of leaded fuels) contribute to air pollution; acid rain, resulting from sulfur dioxide emissions, is damaging forests; heavy pollution in the Baltic Sea from raw sewage and industrial effluents from rivers in eastern Germany; hazardous waste disposal

ENERGY INDUSTRIES

Major Energy Companies: Deutsche Shell, Esso, OMV, Preussag Anthrazit, Ruhrgas, Ruhr Oel, Ruhrkohle, Saarbergwerke, Siemens, Veba Oel, Wintershall
Major Refineries (capacity, bbl/d): Karlsruhe (268,800), Vohburg/Ingolstadt/Neustadt (258,000), Schwedt (230,000), Gelsenkirchen (227,000), Leuna (214,620), ilhelmshaven (180,000), Godorf (170,000), Wesseling (120,000), Esso Ingolstadt (105,000)

For more information from EIA on Germany, please see:
EIA - Country Information on Germany

Links to other sites:
1997 CIA World Factbook - Germany
U.S. Department of Energy's Office of Fossil Energy's International section - Germany
U.S. State Department's Consular Information Sheet - Germany (March 1997)
U.S. State Department's Country Commercial Guide - Germany
U.S. State Department Background Notes on Germany - May 1997

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Exhibit R

Germany May Shut Nuke Plants

Thursday, December 17, 1998; 2:08 p.m. EST

BONN, Germany (AP) -- Chancellor Gerhard Schroeder and major power companies have agreed to close Germany's nuclear plants within 20 years, a magazine reported Thursday.

An accord, to be fleshed out in detailed talks starting next month, would rule out compensation claims by utilities for scrapped power plants, the newsweekly Der Spiegel said.

Government spokesman Uwe-Karsten Heye called the report ``speculation."

Schroeder's seven-week-old center-left coalition government, which includes the environmentalist Greens, has set shutting down the nation's 19 nuclear plants as a top goal -- a policy reversal for Germany.

Juergen Trittin, the new Greens environment minister, has said he wants to shut down as many nuclear power plants as he can ``as soon as possible."

Commenting on the Spiegel report, Trittin called it ``a frivolous, unbelievable speculation." He said the government coalition planned to meet in Berlin on Jan. 13 to formulate a joint policy on nuclear energy.

September elections

The report said Schroeder had agreed on a timetable for the closures in talks Monday with the bosses of Germany's four biggest energy providers: RWE, Veba, Viag, and Energie Baden-Wuerttemberg.

Schroeder at the time described the talks as preliminary and announced no agreements.

If confirmed, the timetable would be much slower than sought by the Greens, the junior partner to Schroeder's Social Democrats, but quicker than industry has so far proposed.

While the Greens have talked about closing the plants in five to 10 years, an electricity industry trade group this week demanded a 40-year time span.

Efforts to draft a new nuclear power law have already caused a rift in the government alliance, clouding prospects for Schroeder's negotiations with power companies.

Trittin insisted Thursday he will fight for an immediate legal ban on reprocessing spent nuclear fuel from German power plants, which could force them to shut down more quickly than Schroeder wants.

Schroeder failed to settle the dispute in a Cabinet meeting Wednesday, and both parties agreed to put off the issue until next month.

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Exhibit S

SWEDISH ENERGY FORUM

NO MAP
PRESENTLY

Chairman: Stig Sandklef
Secretary General: Carl-Erik Wikdahl

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Internet: www.abb.se/atom/abbatom.htm

NUCLEAR INSTALLATIONS

Nuclear Power Stations in Operation

Power stations		**4**
Type of reactor	**BWR**	**PWR**
Net output (MWe)	**7335**	**2700**

TOP

NUCLEAR POWER STATIONS PLANNED
Sweden has no current plans to build additional nuclear power units.

ELECTRICITY GENERATION

TOP

THE NUCLEAR CONTRIBUTION - 1997

Operational nuclear power units	**12**
Total installed capacity	**10.0 GWe**
Total generation of electricity	**144.9 TWh**
Net imports of electricity	**2.7 TWh**
Nuclear electricity generated	**66.9 TWh**
Nuclear share of power generated	**46.2%**
Average load factor	**76.4%**
Units under construction	**0**

TOP

TOP

ENERGY SUPPLY

After the recent deregulation of the electricity market (in Sweden from 1 January 1996) there is now a system for free trade of electricity in Finland, Norway and Sweden. Part of the electricity is traded by long term bilateral contracts but from 1996 there is a growing electricity spot market working in these countries. A market for futures (up to three years) was opened during 1997. The common Nordic electricity market is one of the largest and most advanced deregulated electricity markets in the world.

TOP

During the last ten years power generation in Sweden has been composed of

TOP

almost 50% hydro and 50% nuclear with a few percent other thermal power. Hydropower generation varies depending on the water resources in the dams. It can vary between 51 TWh as in 1996 and 73 TWh as in 1993. Most of the power from thermal plans other than nuclear is produced in combined heat and power (CHP) plants. There is a growing use of biomass as fuel in these plants. In 1997 more than 6 TWh of electricity was produced in this way.

TOP

NUCLEAR POWER GENERATION

The twelve operational nuclear power units have a total capacity of 10 035 MWe. Oskarshamn 1, the first unit to be commissioned, became operational in 1972. The last unit to be commissioned was Oskarshamn 3, in 1985. The average load factor of the twelve reactors has been well above 85 percent for several years. It was lower during 1992 - 1993, and 1997 because the oldest reactors have been done for repair and modernisation.

All twelve nuclear power units in Sweden have filtered vented containments with a level of efficiency that removes the need for permanent evacuation in the event of severe core damage.

FUEL CYCLE

Fuel Management
Sweden imports all of its uranium and enrichment services. Most of the fuel for the nuclear plants is made by ABB Atom at its fuel factory at Västerås. This factory has an annual capacity of 600 tonnes of LWR fuel. Half of this production is exported.

Radioactive Waste Management
The Swedish utilities own a subsidiary, the Swedish Nuclear Fuel and Waste Management Company (SKB), which has developed a comprehensive waste research and management programme. SKB has prepared conceptual systems for the final disposal of high-level waste. These concepts have been presented to the Swedish safety authorities and subjected to international review. The government has taken the view that the concepts are sound with regard to safety and radiation protection. SKB is now concentrating on the development of a system for the direct disposal of spent fuel, 500 metres underground, without reprocessing.

Final Repository for High-Level Radioactive Waste
Decisions concerning the exact design and location of this final underground repository for high-level radioactive waste have not yet been taken, but the Äspö Hard Rock Laboratory has been built near to the Oskarshamn nuclear power site. In 1995, a comprehensive international research programme began at this laboratory, under actual field conditions, at a depth of 450 metres. A site selection programme is under way, with a target of depositing the first spent fuel in the final repository sometime between the years 2010 and 2015.

Interim Central Storage
A central facility for interim storage, designed to store all used fuel from the Swedish reactor programme, was taken into service in 1985. Its capacity was expanded from 3000 tonnes originally planned, to 5000 tonnes some years ago. There are now advanced plans to double this capacity. The final licence was received in May 1998 and the construction is planned to start during autumn 1998 to be completed by 2003. The facility, known as CLAB, is located close to the Oskarshamn nuclear power site. It is planned that CLAB will be

developed to include a plant for the encapsulation of spent fuel in copper canisters. Construction of the encapsulation plant will begin some years after 2000.

Final Repository for Low-Level and Medium-Level Radioactive Waste
A central final repository for low-level and medium-level waste, produced from the operation and decommissioning of nuclear reactors, has been developed at the Forsmark nuclear site. This facility, known as SFR, became operational in 1988.

Funding
All costs of waste management are financed through a fee levied on nuclear power production. This fee is based on the total costs of the back-end of the fuel cycle, to include the interim storage of spent fuel, the decommissioning and dismantling of reactors and the final disposal of all waste generated. Collected revenues are paid into a special fund which is managed by a state authority.

REACTOR INDUSTRY

Design and Engineering
The design and construction of the nine BWRs in Sweden and the two in Finland were carried out by the Swedish company, ABB Atom. An advanced new concept, BWR 90, built on experience gained from Forsmark 3 and Oskarshamn 3 has been introduced by ABB Atom. It has two standard sizes, 1200 and 1375 MWe. Sandvik is one of the main manufacturers of fuel rod cladding tubes and steam generator pipings for the world market.

Services
ABB Atom is also active in the reactor service market in Sweden, Finland and abroad. Studsvik AB has facilities for reactor material testing including a material testing reactor. Studsvik AB is also working on the international market with core management, reactor waste, reactor instruments and reactor services.

NATIONAL POLICY

The decision to phase out nuclear power by the year 2010 was taken by the Parliament in 1980, following a national referendum. This decision was reviewed by Parliament in 1991, when it was confirmed as being subject to the following conditions:

*there should be no detriment to the social welfare programme,

*employment levels in the heavy power consuming industries are to be maintained,

*there should be no increase in the release of carbon dioxide, and

*renewable power sources should be available on an economic scale.

In March 1997, the government proposed legislation to the Parliament to close the Barsebäck nuclear power plant. Parliament ratified the decision in June 1997. The reasons given were purely political without any reference to safety or economics. Under the bill, one unit would close by 1 July 1998 and a second unit three years later. The conditions for closing the second unit are that new electricity generation from renewable domestic energy sources is available at reasonable costs. Full compensation must be paid to the owner of the plant, Sydkraft, by the state. In the new legislation, it was decided that the phase-out deadline of 2010, which the 1980 referendum demanded, is no longer applicable.

The government decision to close Barsebäck unit 1 by 1 July 1998 was overruled by the Supreme Administrative Court. Barsebäck 1 may continue to operate until pending legal matters are settled. In the meantime, the State has started negotiations with Sydkraft about compensation to the utility for closing the Barsebäck plant.

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Exhibit T

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Nuclear Power Generation and Fuel Cycle Report 1997

September 1997

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
U.S. Department of Energy
Washington, DC 20585

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(Megawatts-electric)

Country Name	1996[a]	2000	2005	2010	2015	Growth Rate (1996-2005)	Growth Rate (2005-2010)	Growth Rate (2010-2015)
North America								
United States	[b]100,685	99,382	94,965	89,122	62,960	-0.6	-1.3	-6.7
Canada	14,902	14,054	14,054	14,054	11,994	-0.6	0.0	-3.1
Subtotal	**115,587**	**113,436**	**109,019**	**103,176**	**74,954**	**-0.6**	**-1.1**	**-6.2**
W. Europe								
Belgium	5,712	5,712	5,712	5,712	5,712	0.0	0.0	0.0
Finland	2,355	2,610	2,610	2,610	2,610	1.1	0.0	0.0
France	59,948	64,303	62,870	62,870	62,870	0.5	0.0	0.0
Germany	22,282	21,063	21,063	20,723	18,916	-0.6	-0.3	-1.8
Netherlands	504	449	0	0	0	N/A	N/A	N/A
Slovenia	632	632	632	632	632	0.0	0.0	0.0
Spain	7,207	7,207	7,054	7,054	7,054	-0.2	0.0	0.0
Sweden	10,040	10,040	10,040	10,040	6,685	0.0	0.0	-7.8
Switzerland	3,077	3,077	3,077	2,712	2,000	0.0	-2.5	-5.9
United Kingdom	12,928	11,772	10,518	9,568	7,158	-2.3	-1.9	-5.6
Subtotal	**124,685**	**126,865**	**123,576**	**121,921**	**113,637**	**-0.1**	**-0.3**	**-1.4**
E. Europe								
Armenia	376	376	752	752	752	8.0	0.0	0.0
Bulgaria	3,538	3,538	2,722	2,722	1,906	-2.9	0.0	-6.9
Czech Republic	1,648	3,472	3,472	3,472	3,472	8.6	0.0	0.0
Hungary	1,729	1,729	1,729	1,729	1,729	0.0	0.0	0.0
Kazakhstan	70	70	500	500	500	24.4	0.0	0.0
Lithuania	2,370	2,370	2,370	2,370	1,185	0.0	0.0	-12.9
Romania	650	650	1,300	1,300	1,300	8.0	0.0	0.0
Russia	19,843	19,843	23,618	22,758	18,347	2.0	-0.7	-4.2
Slovak Republic	1,632	2,020	1,592	1,592	1,592	-0.3	0.0	0.0
Ukraine	13,765	14,015	13,090	15,577	11,400	-0.6	3.5	-6.1
Subtotal	**45,621**	**48,083**	**51,145**	**52,772**	**42,183**	**1.3**	**0.6**	**-4.4**
Far East								
China	2,167	2,167	6,737	11,542	17,500	13.4	11.4	8.7
Japan	42,369	43,525	50,176	54,768	59,200	1.9	1.8	1.6
Korea, North	0	0	950	1,900	1,900	N/A	14.9	0.0
Korea, South	9,120	12,990	16,790	20,600	24,600	7.0	4.2	3.6
Taiwan	4,884	4,884	7,384	7,384	7,384	4.7	0.0	0.0
Subtotal	**58,540**	**63,566**	**82,037**	**96,194**	**110,584**	**3.8**	**3.2**	**2.8**
Other								
Argentina	935	935	1,627	1,292	1,292	6.3	-4.5	0.0
Brazil	626	626	1,871	1,871	1,871	12.9	0.0	0.0
India	1,695	2,503	2,653	5,913	7,900	5.1	17.4	6.0
Iran	0	0	1,073	2,146	2,146	N/A	14.9	0.0
Mexico	1,308	1,308	1,308	1,308	1,308	0.0	0.0	0.0
Pakistan	125	425	425	725	600	14.6	11.3	-3.7
South Africa	1,842	1,842	1,842	1,842	1,842	0.0	0.0	0.0
Turkey	0	0	0	1,300	1,300	N/A	N/A	0.0
Subtotal	**6,531**	**7,639**	**10,799**	**16,397**	**18,259**	**5.7**	**8.7**	**2.2**
Total World	**350,964**	**359,589**	**376,576**	**390,460**	**359,617**	**0.3**	**0.7**	**-1.6**

[a]Status as of December 31, 1996.
[b]1996 U.S. capacity is preliminary.

Table E3. Status of Commercial Nuclear Units Under Construction as of December 31, 1996

Country	Percentage of Construction Completed									
	0 to 25		26 to 50		51 to 75		76 to 100		Total	
	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net Mwe
Western Europe										
France	0	0	0	0	1	1,450	2	2,905	3	4,355
Eastern Europe										
Czech Republic	0	0	0	0	1	912	1	912	2	1,824
Romania	0	0	1	650	0	0	0	0	1	650
Russia	1	600	1	950	1	950	4	3,750	7	6,250
Slovak Republic	0	0	0	0	1	388	1	388	2	776
Ukraine	1	950	1	950	0	0	2	1,900	4	3,800
Subtotal	2	1,550	3	2,550	3	2,250	8	6,950	16	13,300
Far East										
China	2	1,200	0	0	0	0	0	0	2	1,200
Japan	0	0	0	0	0	1	1	1,315	1	1,315
Korea, South	2	1,900	0	0	4	3,220	1	650	7	5,770
Taiwan	2	2,500	0	0	0	0	0	0	2	2,500
Subtotal	6	5,600	0	0	4	3,220	2	1,965	12	10,785
Other										
Argentina	0	0	0	0	0	0	1	692	1	692
Brazil	0	0	1	1,229	1	1,245	0	0	2	2,474
Cuba	0	0	0	0	2	816	0	0	2	816
India	2	900	0	0	4	808	0	0	6	1,708
Iran	0	0	0	0	0	0	2	2,146	2	2,146
Pakistan	0	0	0	0	1	300	0	0	1	300
Subtotal	2	900	1	1,229	8	3,169	3	2,838	14	8,136
Total World	**10**	**8,050**	**4**	**3,779**	**16**	**10,089**	**15**	**14,658**	**45**	**36,576**

MWe = Megawatt-electric.
Source: "World List of Nuclear Power Plants," *Nuclear News* (March 1996), pp. 29-44. *Nucleonics Week* (various issues).

Table E4. Status of Planned or Indefinitely Deferred Commercial Nuclear Units as of December 31, 1996

Country	Percentage of Construction Completed									
	0 to 25		26 to 50		51 to 75		76 to 100		Total	
	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net MWe	No. of Units	Net Mwe
North America										
United States	0	0	1	1,212	1	1,170	1	1,212	3	3,594
Eastern Europe										
Armenia[a]	1	376	0	0	0	0	0	0	1	376
Russia	1	950	0	0	0	0	0	0	1	950
Ukraine	1	950	0	0	0	0	0	0	1	950
Romania	1	650	0	0	0	0	0	0	1	650
Subtotal	4	2,926	0	0	0	0	0	0	4	2,926
Far East										
China	9	8,045	0	0	0	0	0	0	9	8,045
Japan	10	11,243	0	0	0	0	0	0	10	11,243
Korea, South	2	1,900	0	0	0	0	0	0	2	1,900
Subtotal	21	21,188	0	0	0	0	0	0	21	21,188
Other										
India	4	2,900	0	0	0	0	0	0	4	2,900
Pakistan	1	300	0	0	0	0	0	0	1	300
Subtotal	5	3,200	0	0	0	0	0	0	5	3,200
Total World	**30**	**27,314**	**1**	**1,212**	**1**	**1,170**	**1**	**1,212**	**33**	**30,908**

[a]The exact stage of construction for the Armenia 1 reactor is unknown.
MWe = Megawatt-electric.
Source: "World List of Nuclear Power Plants," *Nuclear News* (March 1996), pp. 29-44. *Nucleonics Week* (various issues).

Table F7. Low and High Case Nuclear Capacity Projections for 2000, 2005, 2010, and 2015
(Net Gigawatts Electric)

Country Name	Low Case				High Case			
	2000	2005	2010	2015	2000	2005	2010	2015
North America								
United States	89.1	63.0	49.1	22.1	101.0	101.0	99.4	95.0
Canada	14.1	13.7	13.6	11.5	15.0	14.7	14.8	13.1
Subtotal	103.2	76.7	62.7	33.6	116.0	115.7	114.2	108.1
W. Europe								
Belgium	5.6	5.5	5.5	5.4	5.8	5.9	6.0	6.0
Finland	2.6	2.5	2.5	2.5	2.7	2.7	2.7	2.8
France	63.2	61.0	60.2	59.5	65.5	65.0	65.8	66.6
Germany	20.7	20.4	19.9	17.9	21.5	21.8	21.7	20.0
Netherlands	0.4	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Slovenia	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.8
Spain	7.1	6.8	6.8	6.7	7.3	7.3	7.4	7.5
Sweden	9.9	9.7	9.6	6.3	10.2	10.4	10.5	7.1
Switzerland	3.0	3.0	2.6	1.9	3.1	3.2	2.8	2.1
United Kingdom	11.6	10.2	9.2	6.8	12.0	10.9	10.0	7.6
Subtotal	124.7	120.0	116.8	107.5	129.4	127.9	127.7	120.5
E. Europe								
Armenia	0.4	0.8	0.7	0.7	0.4	0.9	1.0	1.0
Bulgaria	3.4	2.7	2.5	1.7	3.9	3.3	3.4	2.5
Czech Republic	3.4	3.5	3.2	3.1	3.9	4.1	4.3	4.6
Hungary	1.7	1.7	1.6	1.5	1.9	2.1	2.2	2.3
Kazakhstan	0.1	0.5	0.5	0.5	0.1	0.6	0.6	0.7
Lithuania	2.4	2.4	2.2	1.1	2.7	2.8	3.0	1.6
Romania	0.6	1.3	1.2	1.2	0.7	1.6	1.6	1.7
Russia	19.9	23.6	21.4	16.8	22.3	28.3	29.0	25.0
Slovak Republic	2.0	1.6	1.5	1.4	2.3	1.9	2.0	2.1
Ukraine	14.1	13.1	14.6	10.4	15.7	15.7	19.9	15.5
Subtotal	47.9	51.1	49.3	38.3	53.9	61.3	67.0	57.2
Far East								
China	1.9	5.6	8.4	11.7	2.2	7.3	12.4	19.8
Japan	41.9	47.5	51.2	54.7	44.0	51.4	56.9	62.4
Korea, North	0.0	1.0	1.6	1.5	0.0	1.1	2.3	2.4
Korea, South	12.3	16.8	17.0	19.1	14.3	19.4	24.6	30.4
Taiwan	4.6	7.4	6.1	5.7	5.4	8.6	8.8	9.1
Subtotal	60.7	78.2	84.3	92.7	65.8	87.8	105.0	124.1
Other								
Argentina	0.8	1.6	1.0	0.9	1.0	1.9	1.5	1.6
Brazil	0.6	1.9	1.4	1.3	0.7	2.2	2.2	2.3
India	2.3	2.3	4.7	6.1	2.7	3.0	7.1	9.7
Iran	0.0	0.9	1.7	1.7	0.0	1.1	2.4	2.6
Mexico	1.3	1.3	1.3	1.3	1.3	1.3	1.5	1.5
Pakistan	0.4	0.4	0.6	0.5	0.5	0.5	0.9	0.7
South Africa	1.7	1.7	1.5	1.5	1.8	2.0	2.0	2.2
Turkey	0.0	0.0	1.2	1.2	0.0	0.0	1.4	1.4
Subtotal	7.0	10.0	13.5	14.5	8.1	12.0	18.9	22.0
Total World	**343.6**	**336.0**	**326.5**	**286.7**	**373.2**	**404.7**	**432.9**	**431.9**

Notes: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels, Supply Analysis Division.

Exhibit U

DOE/EIA-0619
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Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects

May 1998

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
U.S. Department of Energy
Washington, DC 20585

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Table 1. U.S. and Russian Surplus Defense Inventories Considered in This Report

Country	Inventory	Source
Russia	Highly Enriched Uranium (HEU)	Russian HEU Agreement 1993; implementation contract 1994, amended 1996
United States	Highly Enriched Uranium (HEU)	U.S. Department of Energy, Record of Decision for the Disposition of Surplus HEU, July 1996
	Natural uranium and low-enriched uranium (LEU)	U.S. Department of Energy, Environmental Assessment of the Proposed Sale of DOE Surplus Natural and Low Enriched Uranium, October 1996
	Plutonium (see note)	U.S. Department of Energy, Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Materials, December 1996

Note: U.S. Government surplus plutonium was not considered for the three analysis cases presented in this report.

conform to stringent regulations, U.S. disposition activities have lagged behind the conversion of Russian HEU. Nevertheless, the U.S. Government announced plans in 1996 for the commercialization of U.S.-origin HEU and plutonium, as well as natural uranium already in forms that can be used without further conversion to produce fuel for commercial reactors (Table 1). Russia announced plans in 1996 for the disposition of weapons-grade plutonium.

Under currently approved plans for the disposal of U.S. and Russian surplus defense HEU and natural uranium, the equivalent of nearly 500 million pounds U_3O_8 would be made available over the next 15 to 20 years for use in producing commercial nuclear fuel. The total quantity corresponds to the uranium projected to be required for all the world's reactors over the period 1997-1999 (442 commercial nuclear power reactors were operable in the world as of December 31, 1996).[7, 8] Proposed plans for using surplus plutonium in fuel for U.S. and Russian reactors could displace some uranium by the middle of the next decade. The quantity of plutonium declared as surplus by the U.S. and Russian governments corresponds to fuel for 100 reactor-years of operation with current technologies,[9] equivalent to less than 1 year of fuel requirements for the 110 U.S. reactors operable as of December 31, 1996.[10] However, not all surplus plutonium is intended for use in commercial nuclear power plants. Some of it will be immobilized in combination with other materials and placed in a geologic repository. Because Russian commercial nuclear fuel requirements are filled only from internal sources, the effects on the world nuclear fuel market of the decision by the Russian government to burn surplus plutonium in commercial reactors is not considered in this report.

This report is divided into two sections: (1) materials and policies, and (2) market effects. Background information about the nuclear materials and the policies involved in U.S. and Russian government commercialization plans is provided in Chapters 1 through 5. The last two chapters focus on the potential market effects of commercialization. An assessment of the key market penetration factors is presented in Chapter 6. Chapter 7 provides an analysis of the effects of U.S. and Russian surplus defense inventories based on different scenarios of market penetration.

[7] EIA projects annual world requirements to be 483 million pounds U_3O_8 over the 3-year period, 1997-1999. See Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Table F2.

[8] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Table D1.

[9] *Final Report of the U.S.-Russian Independent Scientific Commission on Disposition of Excess Weapons Plutonium*, June 1, 1997, released by The White House Office of Science and Technology (Washington, DC, September 10, 1997), p. 9.

[10] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), p. ix.

Table 5. Characterization of Inventory in Relation to the U.S. Department of Energy's Disposition Program for Surplus Weapons-Usable Highly Enriched Uranium (HEU), as of February 28, 1998

Quantity (metric tons)	Form	Average ^{235}U Assay (percent)	Commercial Character of Derived LEU[a]	Proposed Start Year for Commercial Use	Commercial Outlet[b]	Comments
13	UF_6	75.7	Spec	Ongoing	Transferred to USEC in 1993 for subsequent sale.	To cover costs associated with liabilities at DOE-owned enrichment plants. Subject to IAEA inspection as HEU is blended down into LEU.
50	Metal, Oxide	41.3	Spec	1998	Transferred to USEC beginning in 1998 for subsequent sale.	Directed by *USEC Privatization Act* (1996). Committed to IAEA safeguards; material will be available for inspection upon undergoing disposition.
38	Metal, Fuel elements, Oxide	66.0	Off-spec	By 2003	Transfer to TVA for direct reactor use: lead test assembly 1999, reactor reloads beginning by 2003.	Utilization plan for at least 30 metric tons HEU pursuant to Memorandum of Understanding between DOE and TVA, January 1997. Other HEU could be utilized, the remainder disposed of as waste.
10	Metal	93.2	Spec	Possibly 2003	Not determined.	Placed under IAEA safeguards in 1995.
45	Assorted	Various	Largely Spec	Possibly some before 2005	Not determined.	Most commercialization after 2010; some to be disposed of as waste.
16	Spent fuel	Various	N/A	N/A	N/A	Waste.
2	Assorted	Various	N/A	N/A	N/A	Waste.
174						

[a]The isotopic or chemical composition of the HEU and the selection of blendstock will determine whether or not the down-blended low-enriched uranium (LEU) is within the specifications developed by the American Society for Testing and Materials (ASTM): specification (spec) versus off-specification (off-spec).

[b]Highly enriched UF_6 is being blended down directly into low-enriched UF_6, a marketable nuclear fuel product, in a commercial uranium enrichment production stream. All other forms of HEU will require blending down into an intermediate form of low-enriched uranium before it can be used in producing commercial reactor fuel.

UF_6 = uranium hexafluoride.

IAEA = International Atomic Energy Agency, TVA=Tennessee Valley Authority, USEC=United States Enrichment Corporation.

N/A = not applicable.

Sources: U.S. Department of Energy, Office of Fissile Materials Disposition, *Highly Enriched Uranium Disposition Plan* (Washington, DC, September 1996); C. Williams III and J. Arbital, "Disposition of Excess Highly Enriched Uranium Status and Update," paper presented at the Nuclear Energy Institute's International Uranium Seminar 97 (Monterey, CA, September 28-October 1, 1997), p. 12; D. Tousley, personal correspondence (DOE Office of Fissile Materials Disposition, Washington, DC, November 18, 1997); R. Schmidt, personal communication (HEU Disposition Program Office, Oak Ridge, TN, March 3, 1998).

and then only at a rate of 10 percent a year while not exceeding 4 million pounds U_3O_8 equivalent. DOE's Office of Fissile Materials Disposition has included an assessment of this action as part of its overall assessment of HEU disposition.

Plutonium

Surplus Inventory Characterization

DOE has officially declared 38.2 metric tons of U.S. weapons-grade plutonium as surplus.[117] This plutonium is equivalent to about 17 million pounds of U_3O_8.[118] Other inventories are expected to increase the quantity of U.S. Government surplus plutonium to approximately 50 metric tons.[119] Of the 50 metric tons of plutonium identified as surplus, 31.8 metric tons are metal contained in components of dismantled nuclear weapons, called "pits," or in other forms.[120] The remainder of the inventory contains impure metal alloys, various oxides, and reactor fuel. DOE has adopted the term "weapons-usable" to characterize its surplus plutonium inventories. To meet the President's nonproliferation policy, DOE is required to dispose of surplus weapons-usable plutonium in a proliferation-resistant fashion. Also, the surplus plutonium, including that coming from dismantled weapons, will be made available for IAEA inspection. To be available for inspection, pits will have to be disassembled and converted to unclassified forms.

Development of Plutonium Disposition Alternatives

Unlike HEU, which can be readily converted to proliferation-resistant LEU, the disposition of separated plutonium is much more difficult. The difficulty arises because the fissile isotopes of plutonium cannot be blended down into a commercial form unusable for the manufacturing of weapons. In a U.S. Government-commissioned study completed in 1994, the National Academy of Sciences (NAS) advanced the position that the disposition of surplus weapons-grade plutonium should result in plutonium being made roughly as inaccessible for weapons use as the much larger and growing quantity that exists in spent fuel from commercial reactors.[121] The NAS concluded that two alternatives used in parallel would provide a reasonable approach for meeting its "spent fuel standard." The two alternatives, each requiring the conversion of plutonium metal into oxide, are: (1) immobilization into chemically stable forms suitable for disposal in a geologic repository (immobilization alternative) and (2) fabrication into MOX fuel that will be irradiated in commercial nuclear power reactors (reactor alternative). Subsequent studies by the American Nuclear Society (1995) and the U.S.-Russian Independent Scientific Commission on Disposition of Excess Weapons Plutonium (1997) have supported the NAS position.[122, 123]

The reactor alternative is based on commercially established technologies that have been used for many years in Western Europe and Japan (see Chapter 2). To accelerate the timetable for disposition while other facilities are being developed, the U.S.-Russian Independent Scientific Commission recommended existing European MOX fuel fabrication plants for producing initial fuel batches of weapons-plutonium MOX to be irradiated in U.S. and Russian reactors.[124] The irradiation of weapons plutonium in commercial nuclear power reactors would be limited to a "once-through" fuel cycle, in which the discharged spent fuel would not be reprocessed but rather disposed of in a geologic repository. Although the irradiation of MOX fuel would not burn up all of the contained plutonium, the fissile plutonium would be diluted with newly generated non-fissile plutonium isotopes. The high radiation emitted from fission products forms a radiation barrier to protect the plutonium remaining in discharged spent fuel from diversion. Recovery of fissile plutonium from

[117] U.S. Department of Energy, *Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (Washington, DC, January 14, 1997), Footnote 1, p. 2.

[118] The Uranium Institute, *The Recycling of Fissile Nuclear Materials*, Final report of the recycling working group (London, November 1996), p. 44.

[119] U.S. Department of Energy, Office of Fissile Materials Disposition, *General Requirements Document*, DOE/MD-007 (Washington, DC, October 1, 1996), p. 2-4.

[120] Metal considered as "pure" can contain from trace up to 1 percent impurities.

[121] National Academy of Science, Committee on International Security and Arms Control, *Management and Disposition of Excess Weapons Plutonium*, National Academy Press (Washington, DC, January 24, 1994).

[122] American Nuclear Society, *Protection and Management of Plutonium*, Report of The Special Panel on the Protection and Management of Plutonium (La Grange Park, Illinois, August 1995).

[123] *Final Report of the U.S.-Russian Independent Scientific Commission on Disposition of Excess Weapons Plutonium*, June 1, 1997, released by The White House Office of Science and Technology (Washington, DC, September 10, 1997).

[124] *Ibid*, p. 2.

depends on resolving a variety of issues transcending national and international interests. For example, U.S. Government officials have favored the negotiation of a weapons plutonium disposition agreement between the United States and Russia as a precursor to large-scale expenditures for U.S. disposition facilities.[147] To date, no such agreement exists between the two countries.

The plutonium disposition program would not be implemented until an assessment of the potential environmental impacts has been completed for the proposed siting, construction, and operation of the required facilities. The construction of facilities will be required for converting surplus plutonium materials into plutonium oxide and for fabricating MOX fuel. Because the technology for burning MOX fuel in commercial reactors is well established, most of the uncertainty lies in licensing and public acceptance. Each of the facilities and the commercial reactors where irradiation would take place must be licensed by relevant government agencies. The plutonium disposition program must also gain widespread public acceptance. Environmental interest groups have opposed the reactor option for the disposition of plutonium. For example, the Nuclear Control Institute, the National Resources Defense Council, and Greenpeace petitioned the Nuclear Regulatory Commission in 1996 to reject a proposal by DOE to ship plutonium to Canada.[148] The shipments were to be made to test the feasibility of burning MOX fuel in CANDU reactors (see page 41).

Supply and Demand Constraints in the Western Market

Operable Nuclear Power Generating Capacity

Projections of uranium and enrichment requirements are based on assumptions about nuclear power generation and fuel management practices. One of the most important assumptions, operable capacity, is particularly subject to considerable uncertainty. Electric industry restructuring in the United States and other countries and political opposition, especially in Europe, could result in early plant retirements. In the Far East, Korea and other countries with plans to add nuclear generating capacity have experienced recent economic difficulties.[149] As a result, new plant construction is likely to be delayed as financing becomes more difficult to secure. Also, public opposition to the construction of new nuclear power plants in Japan could result in the installation of less new capacity than had been anticipated. Any of these situations would result in a decline in demand for uranium and nuclear fuel cycle services.

Examples of early retirements announced in 1997 for nuclear power plants are Maine Yankee in the United States and seven reactor units at the Bruce A and Pickering A plants in Canada. Ontario Hydro could possibly return the Bruce A and Pickering A reactors to service, but only upon Board approval based on economic and market considerations.[150] The total net generating capacity of the seven units is approximately 4,600 megawatts-electric.[151] Due to the closures, Ontario Hydro's annual uranium requirements will be reduced by about 1.4 million pounds U_3O_8.[152]

Commercial MOX Fuel Usage

The use of plutonium in MOX fuel displaces the need for newly produced uranium and enrichment services (see Chapter 2). MOX fuel is projected by the Uranium Institute to displace 4.9 million pounds U_3O_8 in 2000, increasing to 8.0 million pounds U_3O_8 in 2010.[153] These projections do not include the possible use of MOX fuel in Russia and the United States. Moreover, recent changes in government policy could limit the growth of MOX fuel usage in existing commercial programs. In October 1997, France's newly elected Socialist government announced that plutonium recycling would not be expanded.[154] This development is particularly significant because France is the leader in MOX fuel utilization.

[147] U.S. General Accounting Office, *Nuclear Nonproliferation and Safety: Uncertainties About the Implementation of U.S.-Russian Plutonium Disposition Efforts*, Report to the Chairman, Committee on Foreign Relations, U.S. Senate, GAO/RCED-98-16 (Washington, DC, January 1998), p. 2.

[148] *The Ux Weekly* (October 7, 1996), p. 2.

[149] "Economic Crisis Tests Pacific Bloc," *The Washington Post* (November 23, 1997), p. A24.

[150] Ontario Hydro, "Statement by William Farlinger, Chairman and Interim Chief Executive Officer," press release (Toronto, August 13, 1997).

[151] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Table D1.

[152] The Uranium Institute, News Briefing 97-33-1 (London, August 1997).

[153] The Uranium Institute, *The Global Nuclear Fuel Market: Supply and Demand 1995-2015* (London, June 1996), Table 8.3.

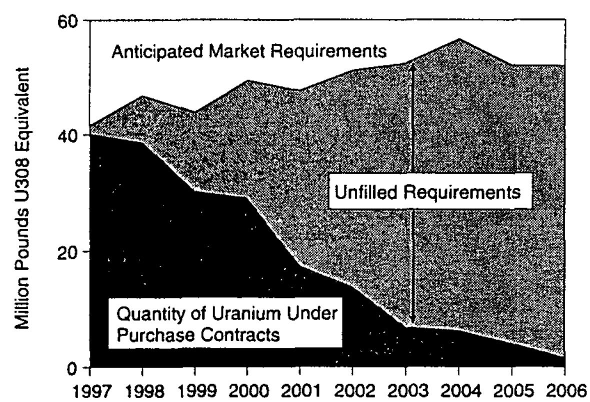
[154] *Nucleonics Week* (October 23, 1997), p. 1.

between the countries played an important role in barring Russian uranium imports. In recent months, however, relations between Japan and Russia have begun to improve. The two countries have exchanged visits by top defense officials and discussed arms sales, and trade and Japanese investments in Russia have been accelerated.[158] This change in the relationship of the two countries suggests that Japan could become a significant consumer of Russian-origin uranium over the next few years. The possibility of Japan purchasing Russian feed could be enhanced should the Russian Executive Agent sell the Russian feed it receives from USEC to suppliers that have established relationships with Japanese utilities.

Unfilled Requirements and Other Procurement Issues

Assuming that commercialization schedules are met, U.S. and Russian surplus defense inventories must compete in the world uranium market against traditional sources of supply. The extent to which utilities' requirements are covered by existing contract commitments with suppliers will dampen the introduction of new sources of uranium. Because utilities operate on long-range planning horizons, a large share of market transactions have been made for long-term supply commitments well in advance of actual deliveries. For example, U.S. utilities reported in the beginning of 1997 that 82 percent of their anticipated 1998 requirements were covered by purchase contracts concluded prior to the end of 1996.[159] In future years, progressively smaller shares of requirements are covered by current contract commitments (Figure 9). Those countries with more conservative procurement policies than the United States would be expected to have a greater share of their future requirements covered by existing commitments. Thus, the opportunities for selling competitively priced uranium, including that from surplus defense inventories, through longer-term contracts will increase in later years.

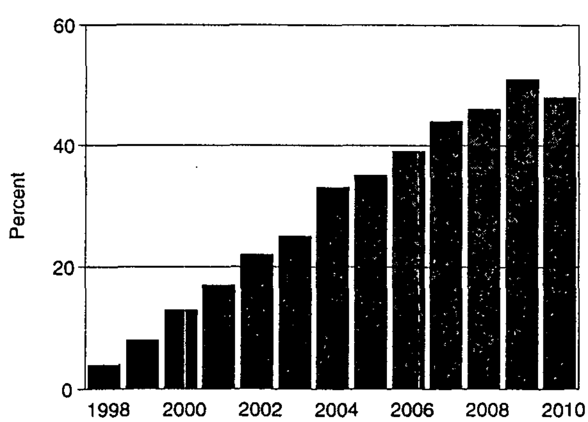
Figure 9. Anticipated Uranium Market Requirements of U.S. Utilities, 1997-2006, as of December 31, 1996



Source: Energy Information Administration, *Uranium Industry Annual 1996*, DOE/EIA-0478(96) (Washington, DC, April 1997), Table 21.

Utilities have traditionally favored procurement from diversified suppliers. By the end of the next decade, the quantity of Russian feed that is permitted by law to be sold to U.S. end users will reach one-half of U.S. reactor requirements (Figure 10).[160] Because of diversification policies, sales of Russian feed to U.S. utilities might not reach the maximum level permitted by law.

Figure 10. Quota for Deliveries to U.S. End Users of Uranium Feed from the Blending Down of Russian Highly Enriched Uranium to Low-Enriched Uranium as a Share of Projected U.S. Uranium Requirements, 1997-2010



Sources: Projected U.S. uranium requirements—Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, DOE/EIA-0436(97) (Washington, DC, September 1997), Table F1; U.S. quota—USEC Privatization Act (April 26, 1996), Section 3112 (b).

[158] "Tokyo and Moscow Show Warming Relations," *The Washington Post* (May 31, 1997), p. A14.
[159] Energy Information Administration, *Uranium Industry Annual 1996*, DOE/EIA-0478(96) (Washington, DC, April 1997), Table 21.
[160] Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report 1997*, (DOE/EIA-0436(97) (Washington, DC, September 1997), Table F1.

The three Western producers, USEC, Cameco, and Cogema, were expected to sell most if not all of their acquired uranium through longer term contracts. USEC is also expected to sell SWU in a similar fashion. Producers would also have the flexibility to modify production plans to accommodate these acquisitions by closing down more costly capacity or delaying the start of new projects. These strategies are likely to ensure more stable prices, which would support the costs of producing uranium or providing enrichment services.

Nukem, on the other hand, could sell a much greater share of uranium on the spot market than the producers group. Without its own production capacity, Nukem could implement a marketing strategy directed toward gaining market share at the expense of producers and decreasing its inventory holding costs, in part by offering uranium at competitive prices on the spot market. Selling on the spot market, however, has become increasingly unattractive with recent price declines. The average uranium spot-market price has declined from $16.50 per pound U_3O_8 in June 1996 to below $11.00 per pound U_3O_8 in June 1997.[161] More likely, a firm engaged in trading would conclude a significant number of long-term contracts to establish itself as a reliable supplier.

Russia is also expected to favor longer term contracts. The HEU feed provides GNSS and TENEX with an alternative source of supply to meet existing contracts and pursue new contracts. Historically, Russia has exported uranium from inventories and mine production. Russia has indicated that it would sell the uranium feed at a floor price above the average of world market prices.[162]

Under current plans to transfer HEU and natural uranium, USEC could receive the equivalent of up to 37.5 million pounds U_3O_8 and 5.7 million SWU in HEU and natural uranium transferred from DOE. The ownership of natural uranium could allow USEC to become a major producer of enriched uranium product.

Excess Commercial Inventories

Since the early 1980s, excess inventories held by suppliers and utilities have filled a gap between uranium production and demand in the West. Imports from the Commonwealth of Independent States (CIS), especially from Kazakhstan, Russia, and Uzbekistan, have contributed to this supply. For example, Euratom reported that the equivalent of 43.2 million pounds U_3O_8 was imported to the EU from the CIS in 1996.[163] Of this amount, 17.7 million pounds U_3O_8 was under purchase contracts for EU utilities. The remaining quantity of uranium was held in inventory for later delivery to customers both in and outside the EU. In comparison, Kazakhstan, Russia, and Uzbekistan produced only 12.5 million pounds U_3O_8 from mines during 1996 (Figure 11).[164] From these data, it is evident that the CIS had been exporting uranium from inventories.

In the United States, inventories held by utilities and suppliers, excluding DOE and USEC, increased from the equivalent of 72.5 million pounds U_3O_8 at the end of 1995 to 81.2 million pounds U_3O_8 at the end of 1996, a gain of 12 percent.[165] This increase, the first for the United States since the early 1980s, is attributed to discretionary purchases made by utilities during 1995 and 1996.

Because of the uncertainty regarding the availability of CIS imports, it is difficult to assess the level of excess inventories in the future. Commercial inventories are likely to continue to be an important supply over the next several years. By 2000, CIS imports are expected to decrease to levels matching production. With less available CIS supply, commercial inventories could be drawn down to levels no longer considered as excessive. At the same time, U.S. and Russian surplus defense inventories are expected to fill the role held by traditional commercial inventories in supplying the deficit between uranium demand and production.

Availability of Russian Feed for Western Consumption

Assuming that HEU blending meets the schedule pursuant to the Russian HEU Agreement, not all of the uranium feed component (Russian feed) is likely to be made available for Western consumption. To earn foreign exchange, Russia is expected to sell much of the Russian feed to the West. Nevertheless, Russia has

[161] Spot-market price is the monthly Exchange Value for the restricted U.S. market, as reported in TradeTech, *The NUCLEAR Review* (August 1997).
[162] Cameco Corporation, "Discussions Suspended Concerning Russian Highly Enriched Uranium," press release (December 11, 1997).
[163] Euratom Supply Agency, *Annual Report 1996*, p. 10.
[164] The Uranium Institute, "World Uranium Production and Nuclear Share," fact sheet (October 16, 1997).
[165] Energy Information Administration, *Uranium Industry Annual 1996*, DOE/EIA-0478(96) (Washington, DC, April 1997), Table 31.

Exhibit V

Footnote 26, 30

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 23—November 16, 1998

HIGHLIGHTS

Enrichment:
• NRC papers offer more details on BWXT's downblending of USEC HEU —*page 14*

Fuel Cycle:
• Greenpeace turns spotlight on krypton-85 releases at La Hague —*page 9*
• Cogema, critics spar over legality of storing foreign reprocessing waste —*page 10*
• Cogema official details expansion, including a BWR line, for Melox plant —*page 11*

Nonproliferation:
• MOX effort near stall, again; opponents question U.S. liability —*page 12*

Waste Management:
• EPA-NRC groundwater protection debate likely to intensify with EPA draft rule —*page 4*
• Claims court opens door for damages, declares DOE liable for storage delay —*page 5*
• IAEA official says global inventory of spent fuel will top 340,000 in 2010 —*page 7*
• U.S. official suggests countries may want to work together on disposal —*page 7*
• BNFL delays switching nuclear train site after widespread public fears —*page 8*
• Russians test processor for purification of sub waste —*page 15*

KAZAKHSTAN TELLS DOC IT INTENDS TO TERMINATE SUSPENSION AGREEMENT; USEC SAYS U SALES OFF

Kazakhstan Nov. 10 formally gave notice of its intent to terminate its uranium suspension agreement with the U.S. Department of Commerce (DOC).

Without a suspension agreement, Kazakhstan would no longer be subject to DOC reporting requirements and its uranium could be enriched in Europe and imported into the U.S. under the normal rules applying to substantial transformation of uranium products. The termination will become effective in 60 days, but Kazakhstan has indicated it might rescind the termination if DOC offers an acceptable modification to the current agreement. An acceptable modification would most likely have to include some form of a SWU quota (NF, 2 Nov., 1).

If not, then DOC will have to decide how to move ahead with a final determination on whether Kazakh uranium has been sold in the U.S. at less than fair market value. The original investigation was based on data submitted in 1992 and DOC might want to update that information, a DOC source indicated.

(continued on page 15)

U.S. MULLING MORE DIRECT ROLE IN STALLED HEU FEED NEGOTIATIONS

Shipments of blended-down high-enriched uranium (HEU) from Russia to the U.S. this year have clearly been delayed. Whether they have now been suspended because of the lack of progress in commercial talks between the Russians and three Western companies was an unanswered question as NuclearFuel went to press.

Sources said a frustrated U.S. government is now likely to take a more direct role in those commercial negotiations over the sale of the uranium feed component of the blended-down HEU.

USEC Inc., which pays the Russians for the SWU component of the blended-down HEU, formally confirmed that it anticipates taking delivery of only about 57% of the low-enriched uranium (LEU) that it was expecting to receive this calendar year. Russia was to blend down in 1998 24 metric tons of warhead HEU, producing LEU containing about 4.4 million SWU, and about 18.8 million pounds U3O8. In a filing with the U.S. Securities & Exchange commission Nov. 12, USEC said

IAEA OFFICIAL SAYS GLOBAL INVENTORY OF SPENT FUEL WILL TOP 340,000 MTHM IN 2010

Spent fuel continues to pile up around the world, creating growing demand for interim storage, said a senior IAEA official, who reported that cumulative spent fuel arisings from power reactors are projected to exceed 340,000 metric tons of heavy metal (MTHM) by 2010.

Arnold Bonne, the new director of IAEA's nuclear power & fuel cycle division, told the opening session of an international symposium on spent fuel storage Nov. 9 in Vienna that most countries with nuclear programs have adopted a "wait-and-see" approach to spent fuel management, placing discharged fuel in interim storage and deferring a decision on whether to reprocess it or dispose of it directly as waste.

According to IAEA statistics, 200,000 MTHM of spent fuel had accumulated by the end of 1997. The inventory is growing at the rate of 10,500 MTHM/year, Bonne said.

With the world's current reprocessing capacity, it would take 20 years to work off that backlog, Bonne said. At the same time, given the absence of a repository anywhere in the world, the demand for interim storage is rising. About 130,000 MTHM is currently stored in facilities at the reactor sites or away from them awaiting final disposal, he said.

In his introduction Monday to the week-long symposium, Victor Mourogov, deputy director general for nuclear energy, called spent fuel storage a "vital and essential component in the use of nuclear power."

Comparing current "realities" against what was expected decades ago, Mourogov said that the drastic reduction in the anticipated nuclear power capacity—from 1,000 gigawatts electric (GWe) once projected to 352 GWe operating today, plus another 27 GWe under construction—has resulted in a uranium surplus and in an excess capacity in front-end fuel cycle services. But a continuing delay in introducing fast reactors, and the smaller-than-anticipated reprocessing capacity, has led to a pileup of spent fuel and separated plutonium, and the end of the Cold War has created a new challenge to dispose of ex-weapons materials.

Mourogov noted, however, that spent fuel can be stored safely for long periods. Some has been in storage for over 30 years now.

Mourogov said "once-through" management, with direct disposal of spent fuel in a geologic repository, is "not yet fully demonstrated in practice, since the first encapsulation demonstration facilities are (only now) becoming operational and geologic repositories are not operational yet" and are not expected to be operational until 2010.

The closed cycle with reprocessing and recycle, he said, "is at a further level of demonstration on a large scale in France, on a limited scale in India, Japan, Russia and the U.K., and only on an experimental scale in the U.S." A practical demonstration of the disposal of high-level reprocessing waste remains to be done, he said.

Bonne noted that some countries are adopting different strategies for dealing with different types of fuel and that some follow one approach while evaluating others that might be of use in the future.

"Nearly all countries operating power plants are increasing their existing at-reactor storage capacity by reracking the spent fuel pools with high-density racks and by implementing burn-up credit," Bonne said. "In many countries, these additions do not provide sufficient storage, so AFR (away-from-reactor) storage facilities are also being developed. Many countries with large quantities of spent fuel are choosing AFR dry storage. This type of storage has many benefits, including the possibility of passive cooling and reduced need for services" such as water chemistry, he added.—*Gamini Seneviratne, Vienna*

U.S. OFFICIAL SUGGESTS COUNTRIES MAY WANT TO WORK TOGETHER ON DISPOSAL

A State Department official suggested last week that a multinational high-level waste repository program might be needed.

"I don't think there will be a repository for every nuclear power program," Richard Stratford said during a U.S.-Ukraine nuclear trade conference in Washington, D.C. He noted at one point that because of the difficulties involved in siting a nuclear waste repository or storage facility, joint explorations of geologic disposal might prove to be valuable.

Stratford later noted that this idea is not being pursued by the State Department but that he has been trying to "plant seeds" for the concept.

Stratford eased into his discussion of potential joint programs by noting that the U.S.-Ukraine Agreement for Peaceful Nuclear Cooperation is on its way to being brought into force. The agreement, initialed by officials of the two countries in March, was ratified by the U.S. Congress last month.

A provision lawmakers inserted into the giant omnibus budget bill ratified the document before it sat before Congress for the required full 90 days of continuous session. Congress adjourned for the year before the 90-day period expired. This marked only the second time Congress has taken such action, Stratford said.

The accord will not go into effect until the Ukrainian parliament, the Rada, takes similar action. When that occurs, there may be more opportunities for joint ventures, business arrangements, Stratford said, noting that the accord itself signifies that the two countries share an understanding on such things as nuclear safeguards.

Stratford, however, is not calling for a joint repository program involving the U.S. and Ukraine. Instead, he suggested that certain areas of the world, such as the Far East or Eastern Europe, might benefit from such a program.

The State Department official stressed following his conference address that he was not advocating moving the world's spent nuclear fuel to a South Pacific island, an idea pushed by U.S. Fuel & Security. Fuel shipments to any one production line expected to start operation next year.

Fraize, who is responsible for MOX projects in the strategy, development and projects department of Cogema's fuels & recycle division, unveiled the ongoing project for the "Melox West Fitting Building" to participants in the recent Recod '98 reprocessing/recycle conference in Nice.

Melox's current licensed capacity remains 100 MTHM/yr or 115 MT oxides, but Cogema has long sought to lift that ceiling, and has continued to invest in new equipment and technology so as to be ready when the license arrives.

The Melox West Fitting Building (MWFB)—so called because it is adjacent to and west of the main Melox building—has been under construction for two years under a conventional building permit. French safety authorities decided Cogema didn't need to go through a full licensing procedure including public inquiry to open the MWFB, so long as production remains within the licensed throughput. But environment minister Dominique Voynet (Green), who has co-jurisdiction over nuclear licensing, has put a political hold on the MWFB operation license.

In the past, Cogema has referred to the Melox modernization and diversification project as "Amenagement Melox," or "arrangement" of Melox.

Fraize said Cogema needs the license only to input plutonium, since safety experts have told the company it can do trial uranium runs in the framework of its existing license. That need will make itself felt "at the very beginning of next year," he told NuclearFuel.

Melox is currently dedicated to producing fuel for Electricite de France (EDF) standardized 900-MW PWRs, and its licensed capacity is virtually saturated. But Cogema wants to be ready to produce fuel for Japanese BWRs in the near future, and eventually to diversify to cover a wide range of PWR and BWR fuel assembly designs, made from plutonium recovered from spent fuel with ever higher discharge burnups.

Brought on line in 1995, Melox achieved the planned 100 MTHM capacity within only two years.

Separately, a Cogema official said Melox has theis year demonstrated it can produce 3.8 MTHM of MOX fuel in a single week—under admittedly ideal conditions—and hold that level over a month, confirming that plant's potential to produce up to 250 MTHM in a year if it is licensed to do so.

However, safety authorities have made it clear that Cogema will need a new permit to increased the plant's licensed capacity, and Voynet has made it equally clear she will not willingly sign any license allowing an expansion of MOX fuel production in France. At present, the issue appears stalemated, but Cogema has evidently decided to take the commercial risk of investing in the new equipment, awaiting a political resolution.

Fraize said MWFB, and a parallel modernization project inside the existing building, would produce "a new generation plant." Equipment and processes have been optimized based on the main plant's operation to date, and adapted to meet utilities' new technical specifications, notably for plutonium content, he said.

In 1999, the new Melox, he told Recod '98, will feature a common powder production for all types of fuel, new fabrication equipment for "flexible" pellet production depending on fuel type, and the new building which will mainly contain rod fabrication, pellet sorting, cladding and rod inspection equipment. MWFB's pellet sorting line will feature high-speed industrial robots and a "sophisticated viewing system." The automated rod fabrication and control station has already been extensively tested at Cogema's Advanced Development Center in Grenoble. A new laser-beam dust removal system will ensure better quality control, he said.

Jointly with Toshiba, Cogema has developed an ultrasonic in-line clad weld inspection system for both PWR and BWR fuel. A pneumatic powder transfer system, borrowed from the shuttered Siemens Hanau MOX plant, has been installed in the main building, a system Fraize said represented a large leap in technology from earlier MOX plants.

A new pelletizer has been installed within the main building, he added. Pellets will be transferred to MWFB via a "car-track" system, also a new design.

Slides Fraize projected for the Recod participants confirmed that the Melox transformation is very nearly done. "We will introduce uranium into the new line at the very beginning of next year," Fraize said. He predicted a "very quick" startup phase, saying Melox would be in a position to produce MOX fuel assemblies in configurations "from 8x8 to 18x18," capable of reaching discharge burnups of 55 gigawatt-days/MT, in 1999.

Fraize said Cogema is proud that it was able to install "major equipment" within the main Melox plant in 1998 "without disturbing production."

The transformation of Melox, he predicted, will make the plant "the reference MOX facility for similar international projects to come early in the next century."

Fraize later told NuclearFuel he was thinking of the MOX plant planned by Japanese firms, as well as the international project for MOX fuel fabrication in the Russian Federation.—*Ann MacLachlan, Nice*

MOX EFFORT NEAR STALL, AGAIN; OPPONENTS QUESTION U.S. LIABILITY

The international effort to convert U.S. and Russian weapons-grade plutonium into mixed-oxide (MOX) fuel is again in danger of stalling, with negotiators struggling to put together a detailed bilateral agreement, MOX opponents raising serious questions about the size and extent of U.S. obligations and liabilities, and DOE ruminating over a contract dispute.

The Russian MOX program got an important boost last month when Congress appropriated $200 million to jumpstart the effort (NF, 19 Oct., 18). But U.S. industry and government sources acknowledge it is unlikely the U.S. and Russian negotiators working on the bilateral pact,

Exhibit W

Paper from:

Uranium and Nuclear Energy: 1997

Proceedings of the Twenty-Second Annual Symposium of the Uranium Institute, London, September 1997

Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals

Thomas C Pool

Earlier in 1997 I presented a paper entitled *Production and Non-Production Uranium Supplies*.[1] That paper set forth an outlook for a potential uranium surplus building to over 20 000 tU per year by 2001, just four years from the present (Figure 1). This surplus results from a forecast of more or less stable uranium requirements and increasing primary and secondary supplies. These increasing supplies signal a period of intense competition between suppliers where the cost structure of the supply source will have a major impact on the ability of that source to compete successfully for new sales. We will also see that different goals may enhance or detract from that ability.

Primary Production

World primary production of uranium in 1997 will account for 58% of current estimated requirements. The remaining 42% will be made up from secondary supplies provided through the liquidation of civilian and military inventories, and the recycling or reprocessing of spent fuel (Figure 2).

Current and potential sources of primary uranium supplies may be grouped into the following classifications: operating, standby or proposed. These classifications may be further subdivided into those where uranium is the sole product and those where uranium is a by- or co-product. Each classification has its own cost structure and goals as set forth below.

Operating

During 1997, 53 projects in 24 countries will produce 37 300 tU (Figure 3). Some of these operating production centres have recently expanded production: Cluff Lake, Rabbit Lake and Rössing are making greater utilisation of existing capacity, while Olympic Dam and Ranger are adding to existing capacity. Current operating projects have the capacity to produce up to 46 000 tU per year.

These uranium producers now in operation must reasonably expect to cover current costs in order to remain in operation. The ability to also amortise and depreciate past capital expenditures allows such producers continuing access to capital markets. Sometimes, these costs can be deferred for short periods. Certain producers, such as those utilising in situ leaching, have some latitude in accounting treatment of wellfield development costs; they can be either capitalised or expensed. One may assume that those producers now in operation are the successful competitors of the past.

Standby

Low prices for more than a decade and time itself have taken their toll on former producers. Many uranium production centres of the past have now been decommissioned, and the production capability of the few still remaining on standby is surprisingly small, about 4600 tU per year.

These standby producers are concerned with minimising current non-productive standby costs, yet maintaining the ability to resume production as soon as possible. Resumption, however, inevitably means some additional capital for deferred repairs and replacements as well as the need to acquire and train a new workforce. A short, but very real, learning curve can also be

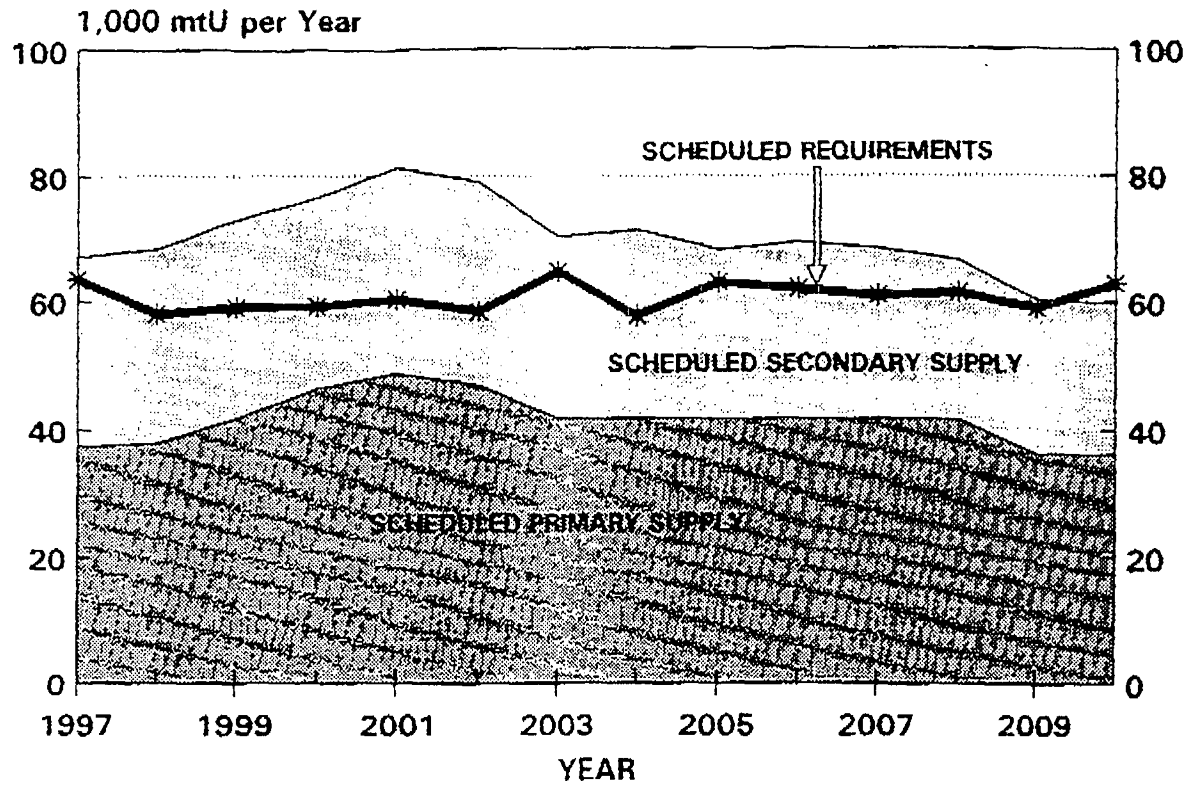


Figure 1. Projected uranium supply–demand balance to 2010.

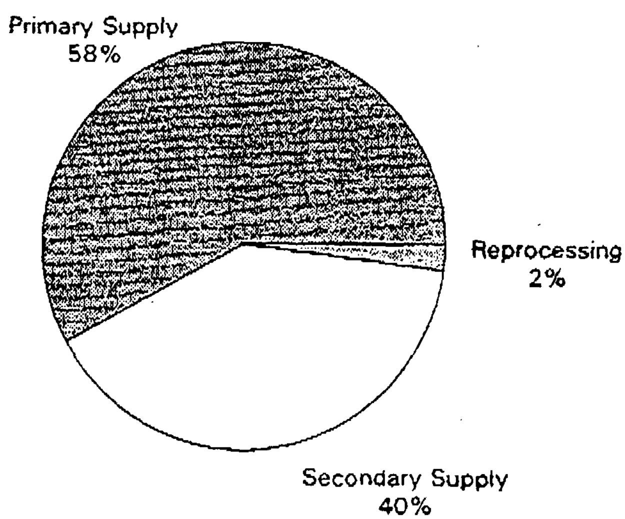


Figure 2. World uranium supply in 1997.

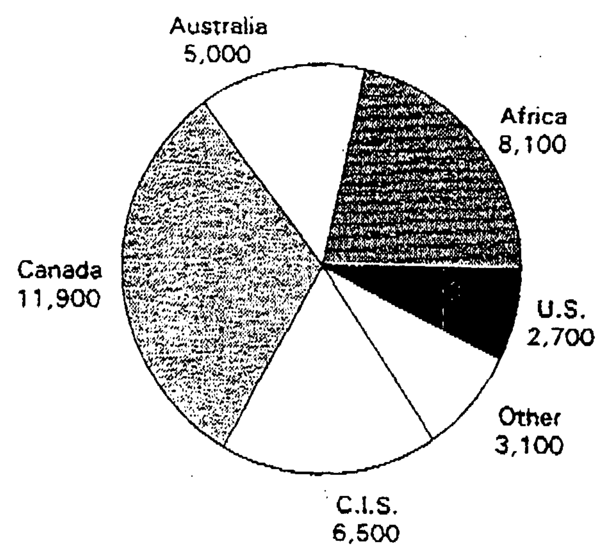


Figure 3. World uranium production in 1997 (tU).

expected. Producers now on standby are those which were not successful competitors. A look at market conditions when these operations were suspended provides at least an indication of the conditions necessary for a restart.

Potential

A large number of potential uranium producers with well defined plans for development and operation exist today. In total, I count about 40 projects with a combined production capability of 42 300 tU per year.

These potential producers are poised to make a major contribution to future uranium supply. Such a contribution, however, requires:

- a major commitment of capital;
- the ability to compete with existing operations;
- acquisition and training of a competent workforce;
- a potentially significant learning curve;

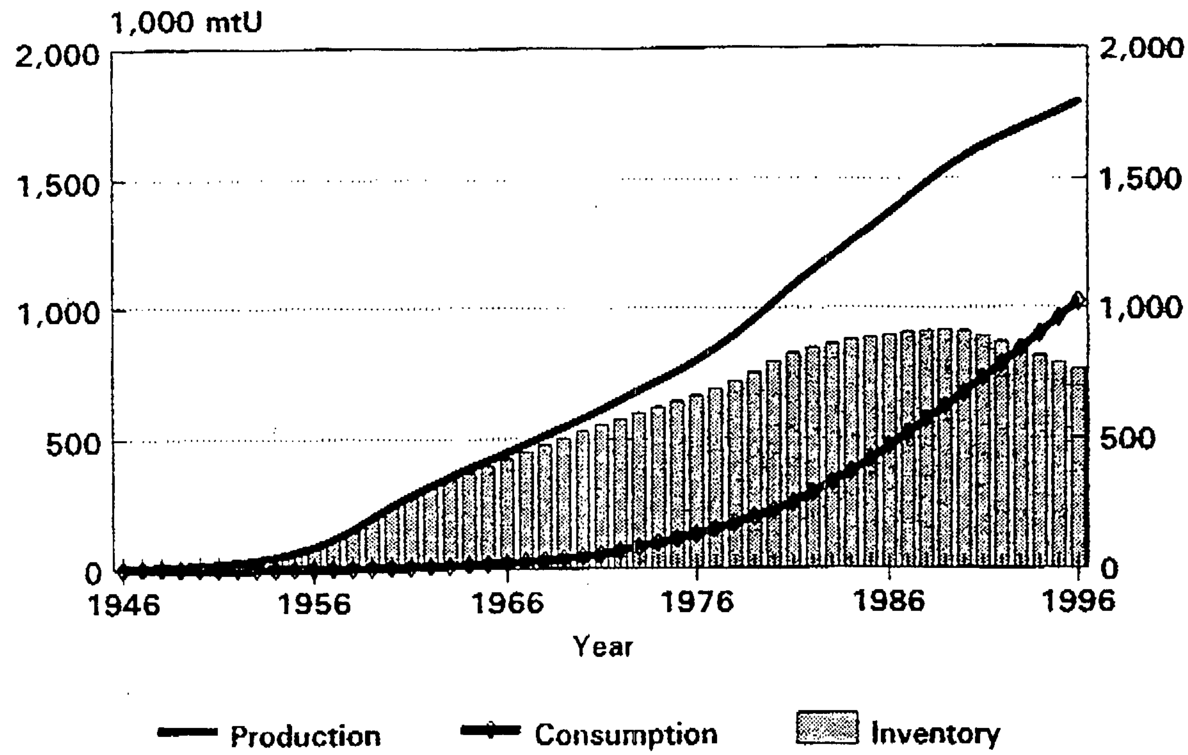


Figure 4. Cumulative world uranium balance since 1946: production, consumption and inventory.

- the need to earn an acceptable return on invested capital;
- contracts for sales of sufficient future production to underwrite the invested capital;
- the ability to withstand repeated assaults by anti-nuclear, as well as anti-mining, forces.

When one assesses the ability of potential producers to compete with existing producers, clearly existing producers have a number of advantages.

By- and Co-Product

Each of the above categories includes by- and co-product producers of uranium. These producers have much greater flexibility than others in that they are not strictly dependent on conditions in the uranium market, but rather on a combination of conditions. Great latitude is also available in the accounting treatment of uranium production costs.

Consider certain gold producers in South Africa, where uranium recovery enhances subsequent gold recovery through a reverse leaching process. Gold credits can amount to as much as US$25/kgU. Thus, uranium production might actually occur at a loss, but that loss is more than balanced by gains on the gold side of the equation. An additional advantage of operating in South Africa is the ability to write off against revenue all capital costs in the year in which they are incurred.

Secondary Supply

Some 1.8 million t of uranium were produced during the period 1946–1996. Actual consumption for both civilian and military needs during the same period is estimated to have been about 1.0 million tU. Thus, approximately 800 000 tU have accumulated as inventory in one form or another (Figure 4). It is this accumulated inventory that provides the vast majority of secondary supply. Substantial uranium inventories are controlled by the US and Russian governments. Additional quantities are controlled by the private sector.

Military Inventories

Military requirements, for nuclear weapons and naval fuel, drove the first phase of the uranium industry from 1942 through to the late 1960s. While cost was not an overriding concern in the West, most military production was obtained under more or less competitive conditions. US government purchases of uranium during this period were 230 000 tU at an average price of just over US$23/kgU (Figure 5).

About 60 000 tU of this have been consumed

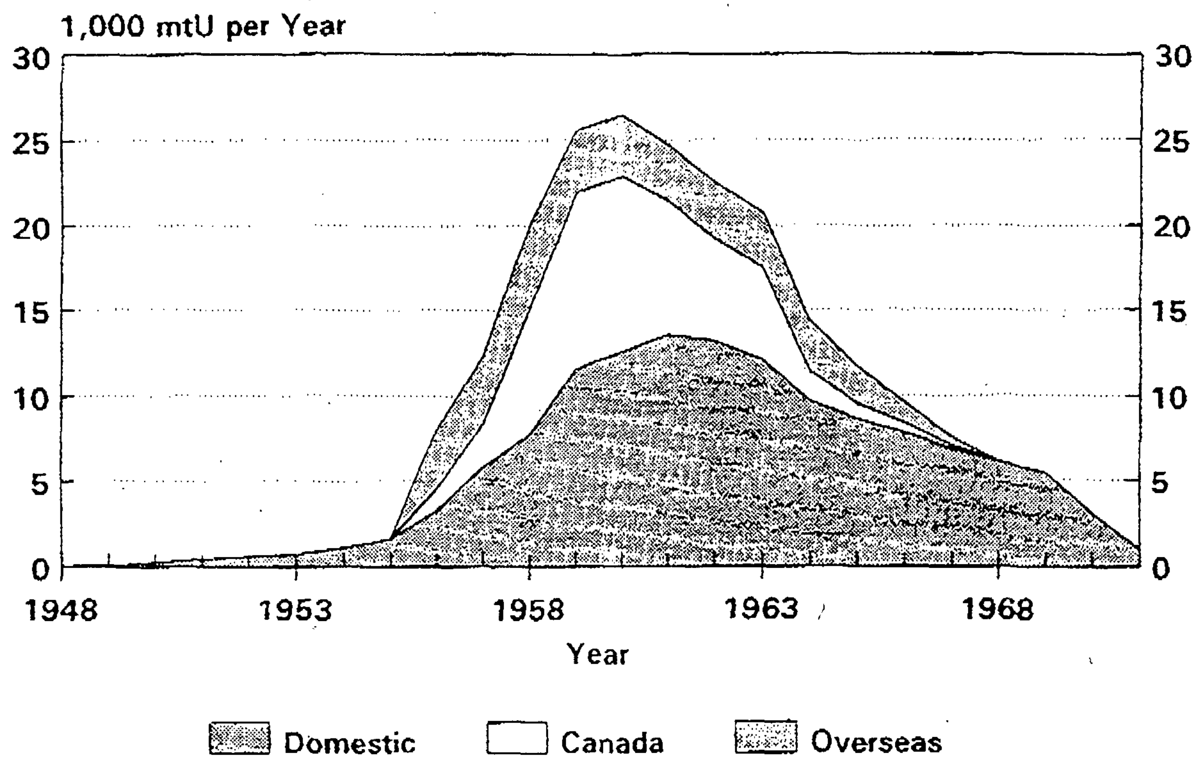


Figure 5. US Atomic Energy Commission uranium purchases.

for weapons testing, plutonium production and naval fuel, leaving the US government with 170 000 tU in inventory in various forms. Some of that material is now entering the market and the flow is expected to increase in the future. Like most surplus government inventories, this uranium no longer has any specific cost associated with it, but rather it is valued only at what it might bring in the marketplace. Thus, it will make no difference if the market is at US$25/kgU or US$50/kgU, this surplus will be available at whatever price exists in the market at the time of the sale.

Soviet/Russian uranium inventories are more difficult to quantify because of the closed system within which they exist and because the military/civilian lines of control are not clearly drawn. Nevertheless, certain information is available upon which some general conclusions can be drawn. Total Eastern Bloc uranium production is estimated to have been 650 000 tU, most of which is reasonably well documented. Military consumption is similar to the West at about 40 000 tU and civilian consumption for nuclear power in Russia and central and eastern Europe has been 170 000 tU. Exports to the West have been about 60 000 tU. Present Russian inventories, in all forms, can therefore be seen to be 380 000 tU (Figure 6).

Much of the total Russian inventory is in the form of high enriched uranium (HEU), perhaps 290 000 tU. This leaves 90 000 tU in a more commercial form. Commercial-grade material is being:

- utilised for Russia's domestic nuclear fuel needs;
- exported to central and eastern Europe under fuel fabrication agreements for Soviet designed reactors;
- exported to western Europe and the USA under quota systems implemented to protect Western producers from this low-cost supply.

It is a low cost supply because of inflation that has ravaged the Russian rouble. Even as late as 1991, uranium production costs in the former Soviet Union were in the range of 40 to 60 roubles per kgU, trivial in terms of the present exchange rate of over 5000 roubles per US dollar. This past production is being sold into today's market at today's prices.

HEU is being blended down into nuclear fuel and some of the feed material has already entered the marketplace. Increasing quantities are expected. Production costs for this HEU were long ago absorbed into the weapons systems and are no longer a part of the present cost structure. Production costs for the blending process were

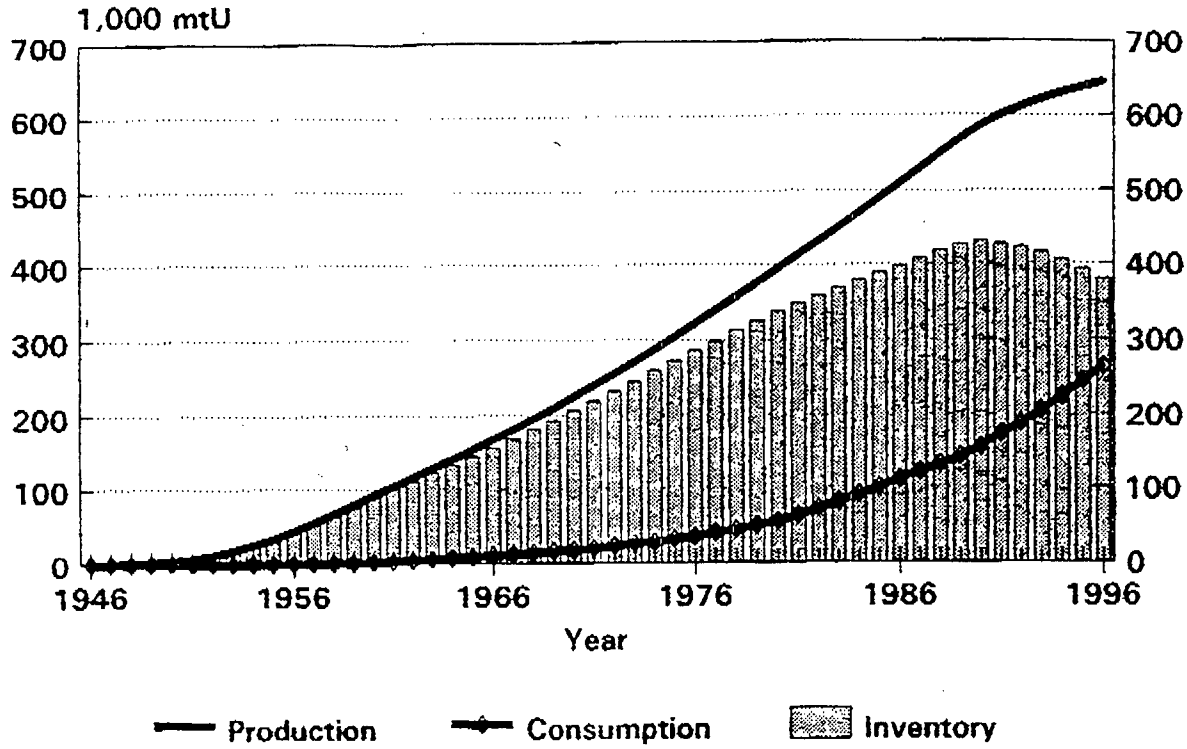


Figure 6. Cumulative CIS uranium balance since 1946: production, consumption and inventory.

recently estimated by the US Department of Energy (DOE) to be as low as US$8/kgU. Thus, while the primary goal is to remove nuclear weapons from the world's arsenals, the profit potential is also very real. In addition, the savings over any other conceivable disposal option are enormous.

Civilian Inventories

Civilian inventories have been a major factor in the uranium marketplace for more than a decade. Traders and intermediaries became more important during this period and through their efforts created a much more efficient marketplace. To date, these efforts have been focused on civilian inventories, those held by utilities as well as those held by producers.

Strategic minimum inventories equivalent to between one and four years' requirements are held by most non-US utilities, and pipeline inventories of about 1.5 years' requirements for the conversion, enrichment and fabrication of nuclear fuel are held by all utilities. These strategic and pipeline inventories might amount to some 150 000 tU. Most US utilities carry very little strategic inventory and are attempting to minimise even pipeline quantities.

During the late 1970s and early 1980s, however, many nuclear utilities ended up with uranium in excess of their immediate needs. These excesses were caused by cancellations or delays in bringing new units on line, restrictive enrichment contracts implemented by the DOE, and perceptions of inadequate supplies. Drawdown of these excess inventories began, in the West, in 1988 and has continued through to the present to a point where almost 150 000 tU have been dissipated. Nevertheless, recent estimates indicate that almost 40 000 tU of excess inventory still remain in the hands of nuclear utilities.

Utilities have generally not sold their excess inventories outright. Instead, they have tended to use them as a buffer to avoid buying higher-priced new uranium, loaned them to others for a small fee, or utilised them as a means of providing security of supply. Increasing competition and increasingly sophisticated accounting systems have brought the cost of these holdings to light, and these factors can be expected to lead to continued reductions in nuclear fuel inventories. Most, if not all, remaining excess utility inventories are scheduled to be drawn down by 2005.

Uranium producers may also hold certain inventories. Some producers, such as Cameco, keep a strategic inventory of as much as one year's supply in order to ensure deliveries should a production interruption occur. Some producers also have excess inventories; such is the case with South Africa and China. South Africa, for example, built up an excess inventory when the USA, Canada, Japan and others enacted anti-apartheid embargoes in the late 1980s. Other inventories crop up from time to time in various forms such as fabricated fuel from a cancelled or shutdown reactor, and material which might have been tied up in litigation. These producer and other inventories have been entering the marketplace at a rate of about 1000 to 1500 tU per year.

From an economic/financial standpoint, most of the costs associated with the accumulation of these civilian inventories are sunk costs, incurred in the past and having little relation to present costs or prices. Accounting treatment of inventory varies somewhat, but in many cases inventories are valued at the lower of cost or net realisable value. This treatment, in itself, has devalued many inventories by severing them from their high-cost past and has made them available to the market on a much more competitive basis.

I recently saw an example in South Africa where a uranium inventory is valued at its "incremental" cost of production. In this case, fixed costs such as labour, repairs, maintenance, some power and water costs, and overhead and administrative costs were written off when uranium entered inventory and only the direct costs of production such as reagents, acid and most of the water and power costs were applied to the inventory value.

Reprocessing

Relatively small quantities of nuclear fuel have been reprocessed to produce either metal fuel for British magnox reactors or mixed oxide (MOX) fuel for light water reactors. A reduction in the quantity of high level waste is the principal advantage of reprocessing. Reprocessing is generally quite expensive when compared to utilising natural uranium, but from an overall standpoint, including waste disposal considerations, the difference is much less. This technology also holds the potential to utilise military plutonium inventories.

At present, reprocessing accounts for only 2% of total nuclear fuel requirements, but growth is taking place and is expected to continue. By 2010 reprocessing is forecast to reduce the world's uranium needs by more than 5%, or more than 3000 tU per year. This is another source of supply that is not particularly cost sensitive, at least in the short term.

Competition

Increasing competition is the hallmark of today's uranium industry. When barriers between East and West evaporated, producers on both sides suddenly found themselves cast into a new era of competition. Western producers screamed "Foul!" and received certain relief in a system of quotas. Eastern Bloc uranium producers, who were in a special privileged class of strategic industries under the former communist regimes, have suddenly found themselves adrift and alone in a new world of international commerce that, for them, had not previously existed. Both sides are now in direct competition on a worldwide basis and both are feeling the impact.

Western producers have been competing with commercial inventories for 15 years or so, as large quantities of these inventories have made their way into the marketplace. The impact of these inventories is diminishing, but that of military inventories is increasing. It is ironic that some of our very long established producers, such as Rio Algom, find themselves now competing against the very same material they might have produced many years ago for the military. Today, however, that material is valued at much less than when it was originally produced.

Eastern Bloc producers are in much the same situation. The entry of Russian HEU into the market puts increasing pressure on those who provided the feed in the first place. And again, the price of this material is less today than its cost in the past.

In the early years of our industry, uranium producers were in direct competition with other uranium producers. The playing field was reasonably level and the goals were similar. That situation changed in the mid 1980s when redistribution of inventories by intermediaries and traders injected a wide array of new competitors into the market. Further change occurred in the early 1990s, as first Soviet and then CIS uranium began to flow in increasing quantities. It is changing again with the addition of US government surpluses, in various forms, to the market. Reprocessing and a shift toward the use of more HEU add to the competitive burden of primary producers.

Who will win the battle for future sales? In short, secondary supply, because of its market-related price structure, is going to displace primary supply. Higher-cost producers will be squeezed out and some potential new producers may not come on stream as scheduled because the outlook

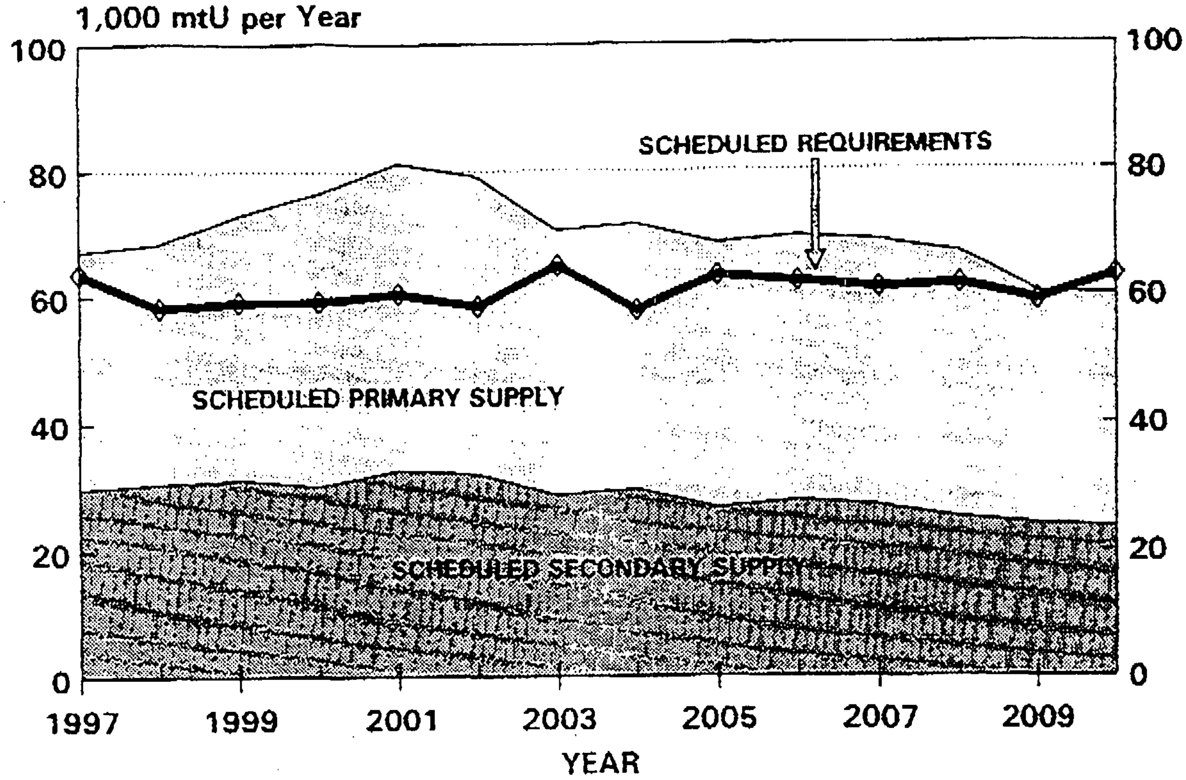


Figure 7. Projected uranium supply–demand balance to 2010, with secondary supplies shown on lower part of chart.

for high returns on large investments has become less favourable.

On this basis, I have revised Figure 1 to show secondary supply on the bottom of the graph, illustrative of its ability to compete (Figure 7). The excess shown above the requirements line illustrates the vulnerability of higher-cost current and proposed primary production. These types of primary production are not necessary, at this time, to bring supply and demand into balance.

Reference

1. Pool TC, *Production and non-production uranium supples.* Paper presented at United States Uranium & Nuclear Conference, Riverton, Wyoming, 20–21 March 1997.

Exhibit X

Footnote 29

Top ten uranium mines in 1996-97 (Western world only)

Mine	Country	Owner	Mine Type	Production (tU)			% of world production			Ra	
				1995	1996	1997	1995	1996	1997	1995	19
Key Lake	Canada	Cameco/ Uranerz	Open pit	5463	5429	5433	16.5	15.4	15.2	1	
Rabbit Lake	Canada	Cameco/ Uranerz	Underground	3147	3972	4632	9.5	11.2	13.0	2	
Ranger	Australia	ERA	Open pit	2550	3508	4095	7.7	9.9	11.5	3	
Rössing	Namibia	RTZ (69%)	Open pit	2007	2452	2905	6.1	6.9	8.1	4	
Akouta	Niger	COGEMA/ Onarem	Underground	1970	2120	2139	6.0	6.0	6.0	5	
Cluff Lake	Canada	COGEMA	Open pit/ underground	1210	1963	1964	3.7	5.6	5.5	6	
Olympic Dam	Australia	WMC	Byproduct (copper) underground	1162	1466	1425	3.5	4.2	4.0	7	
Arlit	Niger	COGEMA/ Onarem	Open pit	1000	1200	1358	3.0	3.4	3.8	8	
Vaal Reefs	South Africa	Anglo-American (27.6%)	Byproduct (gold) underground	858	914	677	2.6	2.6	1.9	9	
Highland	USA	Cameco	ISL	...	461	597	...	1.3	1.7	...	1
Western world total from top ten mines				**...**	**23485**	**25225**	**...**	**66.5**	**70.7**		

Source: Uranium Institute

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Back to Uranium: From Ore to Concentrate

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Exhibit Y

Footnote 30

DOE/EIA-0570(95)
Distribution Category UC-950

Uranium Purchases Report 1995

June 1996

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
U.S. Department of Energy
Washington, DC 20585

This report was prepared by the Energy Information Administration, the independent statistical and analytical agency within the Department of Energy. The information contained herein should not be construed as advocating or reflecting any policy position of the Department of Energy or of any other organization.

Table 1. U.S. Utility Purchases from Suppliers of Uranium by Origin Country and Delivery Year, 1994–1995
(Thousand Pounds U_3O_8 Equivalent, Dollars per Pound U_3O_8 Equivalent)

Material Type and Origin Country	Uranium Deliveries in 1994		Uranium Deliveries in 1995	
	Purchases	Weighted–Average Price	Purchases	Weighted–Average Price
Material Type:				
Natural U_3O_8	28,553	10.66	36,823	11.32
Natural UF_6	7,111	9.85	5,753	11.10
Enriched Uranium	2,617	9.00	865	9.29
Total Quantity	**38,281**	**10.40**	**43,441**	**11.25**
Country of Origin:				
Australia	2,812	9.88	4,448	10.98
Brazil	W	W	0	—
Canada	14,613	10.49	16,799	11.82
China	1,696	9.56	293	11.49
France	W	W	W	W
Gabon	W	W	W	W
Germany	W	W	W	W
Mongolia	W	W	W	W
Namibia	796	9.76	530	9.88
Netherlands	0	—	W	W
Niger	0	—	W	W
NIS[a] Total	**8,665**	**8.71**	**14,345**	**9.36**
Kazakhstan	2,777	8.94	3,097	8.99
Kyrgyzstan	W	W	W	W
Russia	1,779	8.81	5,500	9.45
Tajikistan	W	W	W	W
Ukraine	W	W	W	W
Uzbekistan	3,550	8.35	3,895	8.61
South Africa	1,106	9.64	1,002	12.57
Spain	0	—	W	W
United Kingdom	W	W	W	W
Foreign Total Quantity	**30,563**	**9.97**	**38,195**	**10.84**
United States	7,718	12.08	5,246	14.20
Total Quantity	**38,281**	**10.40**	**43,441**	**11.25**

[a]NIS = Newly Independent States.
W = Withheld to avoid disclosure of individual company data.
— = Not applicable.
Source: Energy Information Administration, Form EIA–858, "Uranium Industry Annual Survey" (1994–1995).

Exhibit Z

Footnote 39

DOE/EIA-0478(97)
Distribution Category UC-950

Uranium Industry Annual 1997

April 1998

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
U.S. Department of Energy
Washington, DC 20585

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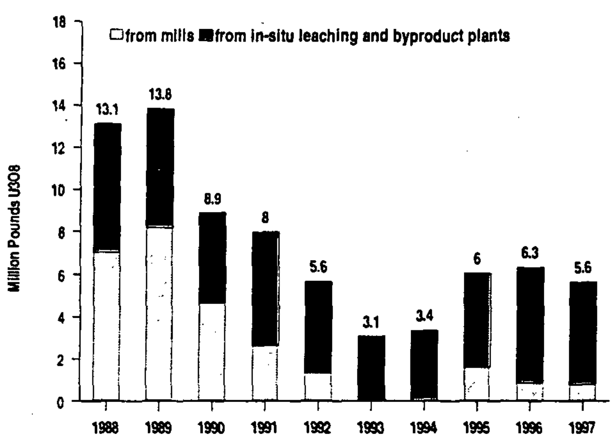
Highlights

Uranium Raw Material Activities

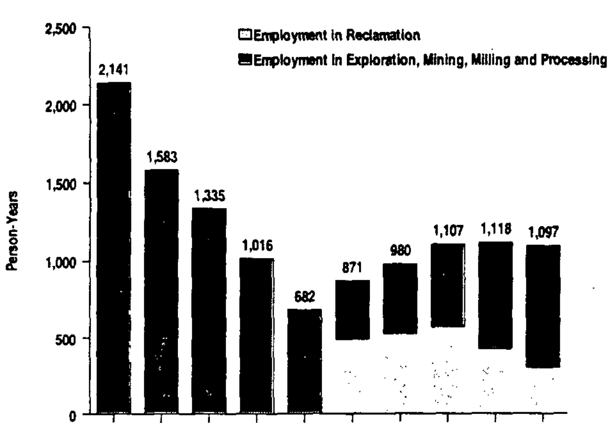
U.S. uranium production (in the form of uranium concentrate) in 1997 totaled 5.6 million pounds, a decrease of 11 percent from the 1996 level (Table H1). Eleven uranium concentrate production facilities operated in the United States. Uranium production at U.S. uranium mills accounted for 14 percent; and in-situ leaching and as a byproduct of phosphate processing combined for 86 percent (Figure H1). Three mills produced uranium concentrate, not by conventional milling of uranium-bearing ore, but by processing uranium from other feed materials.

Figure H1. U.S. Uranium Concentrate Production, 1988-1997



Total exploration and development expenditures in 1997 were $30.4 million. Employment in the raw materials sector of the uranium industry totaled 1,097 person years (Figure H2), an increase in production sector was offset by a decrease in reclamation sector.

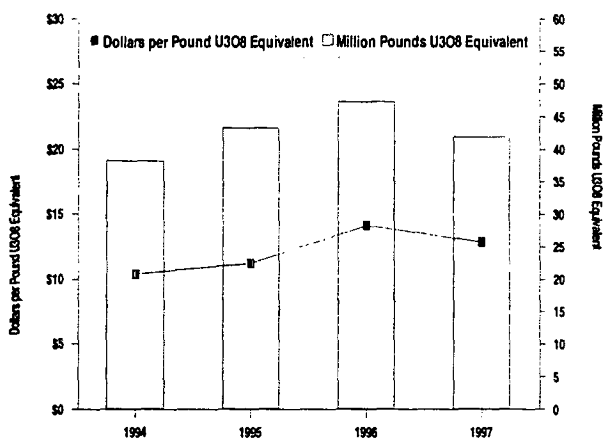
Figure H2. U.S. Uranium Employment, 1988-1997



Uranium Marketing Activities

U.S. utilities purchased from U.S. and foreign suppliers a total of 42.0 million pounds U_3O_8e (equivalent) of deliveries during 1997 (Table H2). The average price paid by the utilities was $12.88 per pound U_3O_8e, a decrease of 9 percent compared with the 1996 price (Figure H3).

Figure H3. Uranium Purchases by U.S. Utilities, 1994-1997



Fuel assemblies loaded into U.S. commercial nuclear power reactors during 1997 contained 48.7 million pounds U_3O_8e (Table H3). Uranium inventories held at the end of the year by U.S. utilities declined in 1997 to 63.9 million pounds U_3O_8e. This represented a 3 percent decrease from the level of inventories at the end of 1996 (Figure H4).

Figure H4. Fuel Assemblies Loaded into U.S. Commercial Nuclear Power Reactors and Uranium Inventories of U.S. Utilities, 1994-1997

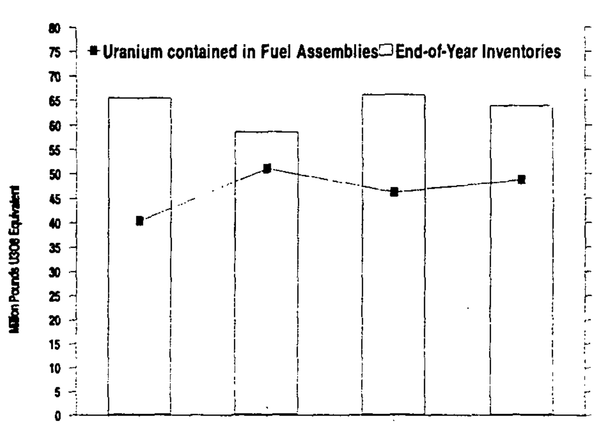


Table H1. Raw Materials Summary Statistics of the U.S. Uranium Industry, 1988-1997

Items	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Exploration and Development										
Surface Drilling (million feet)	3.0	2.2	1.7	1.8	1.1	1.1	0.7	1.3	3.0	4.9
(million meters)	0.9	0.7	0.5	0.6	0.3	0.3	0.2	0.4	0.9	1.5
Expenditures[a] (million dollars)	20.1	14.8	17.1	17.8	14.5	11.3	3.7	6.0	10.1	30.4
Reserves at End of Year										
(million pounds U_3O_8, $US30 per pound)	289	277	265	304	295	292	294	290	285	281
(thousand metric tons U, $US80 per kilogram)	111	107	102	117	114	112	113	112	110	108
Mine Production of Uranium										
(million pounds U_3O_8)	9.5	9.7	5.9	5.2	1.0	2.1	2.5	3.5	4.7	4.7
(thousand metric tons U)	3.7	3.7	2.3	2.0	0.4	0.8	1.0	1.4	1.8	1.8
Uranium Concentrate Production										
(million pounds U_3O_8)	13.1	13.8	8.9	8.0	5.6	3.1	3.4	6.0	6.3	5.6
(thousand metric tons U)	5.1	5.3	3.4	3.1	2.2	1.2	1.3	2.3	2.4	2.2
Uranium Concentrate Shipments										
(million pounds U_3O_8)	12.8	14.8	13.0	8.4	6.9	3.4	6.3	5.5	6.0	5.8
(thousand metric tons U)	4.9	5.7	5.0	3.2	2.6	1.3	2.4	2.1	2.3	2.2
Employment (person-years expended)	2,141	1,583	1,335	1,016	682	871	980	1,107	1,118	1,097

[a]Expenditures are in nominal U.S. dollars.

Note: Specific references for each category of data and year are provided in various detailed text or tables included in the main body of this report. For 1993 through 1997, total employment includes reclamation employment.

Sources: Energy Information Administration: **1988-1996**-*Uranium Industry Annnual 1996* (April 1997); **1997**-Form EIA-858, "Uranium Industry Annual Survey" (1997).

Table H2. Transaction Summary Statistics of the U.S. Uranium Industry, 1994-1997

Actual Deliveries	1994 Quantity	1994 Weighted-Average Price	1995 Quantity	1995 Weighted-Average Price	1996 Quantity	1996 Weighted-Average Price	1997 Quantity	1997 Weighted-Average Price
Purchases by U.S. Brokers and Traders								
(million pounds U_3O_8e; dollars per pound U_3O_8e)	30.8	8.29	22.9	9.53	25.3	12.61	19.7	11.00
(thousand metric tons U; dollars per kilogram U)	11.8	21.56	8.8	24.79	9.7	32.79	7.6	28.60
Purchases by U.S. Utilities								
(million pounds U_3O_8e; dollars per pound U_3O_8e)	38.3	10.40	43.4	11.25	47.3	14.12	42.0	12.88
(thousand metric tons U; dollars per kilogram U)	14.7	27.03	16.7	29.24	18.2	36.71	16.1	33.49
Foreign Purchases by U.S. Suppliers and Utilities								
(million pounds U_3O_8e; dollars per pound U_3O_8e)	36.6	8.95	41.3	10.20	45.4	13.15	43.0	11.81
(thousand metric tons U; dollars per kilogram U)	14.1	23.27	15.9	26.52	17.5	34.19	16.5	30.69
Foreign Sales by U.S. Suppliers and Utilities								
(million pounds U_3O_8e; dollars per pound U_3O_8e)	17.7	11.34	9.8	13.48	11.5	14.20	17.0	12.39
(thousand metric tons U; dollars per kilogram U)	6.8	29.49	3.8	35.06	4.4	36.92	6.5	32.22

U_3O_8e = U_3O_8 equivalent.

Note: Prices are in nominal U.S. dollars.

Source: Energy Information Administration, Form EIA-858, "Uranium Industry Annual Survey" (1994-1997).

Table H3. Summary Statistics of Uranium Fuel and Commercial Inventories, 1994-1997

Items	1994	1995	1996	1997[P]
Fuel Assemblies Loaded into U.S. Commercial Nuclear Power Reactors				
(million pounds U_3O_8e)	40.4	51.1	46.2	48.7
(thousand metric tons U)	15.5	19.7	17.8	18.7
Commercial Inventories at the End of the Year				
U.S. Utility Inventories				
(million pounds U_3O_8e)	65.4	58.7	66.1	63.9
(thousand metric tons U)	25.2	22.6	25.4	24.6
U.S. Utility and Supplier Inventories				
(million pounds U_3O_8e)	86.9	72.5	80.0	75.8
(thousand metric tons U)	33.4	27.9	30.8	29.2

U_3O_8e = U_3O_8 equivalent.

P=Preliminary data. Final 1996 data reported in the 1997 survey.

Source: Energy Information Administration, Form EIA-858, "Uranium Industry Annual Survey" (1995-1997).

Exhibit AA

Footnote 42, 46, 47

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 15—July 27, 1998

HIGHLIGHTS

Fuel:

• International meeting fails to resolve questions surrounding Cabri's future —*page 6*

• NRC strategic plan on fuel burnup shifts future research to industry —*page 7*

Fuel Cycle:

• Loophole in 'historic' Ospar agreement could save European reprocessors —*page 2*

• New Kepco leadership said to be cooler to plutonium option —*page 4*

Nonproliferation:

• German court convicts ex-BND informant for Pakistan centrifuge preform deals —*page 5*

Uranium:

• IUC White Mesa Mill seeks to handle material from Cameco facilities —*page 10*

• NRC says IUC can use Fusrap waste as alternative feedstock at White Mesa —*page 10*

Waste Management:

• Orderly German phaseout may be price for restarting spent fuel transports —*page 8*

• Vectra liquidation plan estimates paying creditors 90% of claims —*page 9*

• Envirocare owner reaches deal with prosecutors on investigation —*page 11*

• Panel doesn't want to be burned again by Energy Secretary with limited power —*page 13*

Weapons:

• Finding Europeans disinterested, Domenici shelves 'global burn' —*page 3*

USEC INC. STOCK BEGINS TRADING AT $14.25; TIMBERS BACKS HEU DEAL, HEALTHY U MARKET

USEC Inc. began trading Thursday, July 23, on the New York Stock Exchange, with its stock opening at a price of $14.25 a share. With 100-million shares being offered, the initial public offering will raise $1.425-billion with $42.3-million going for underwriters' discounts and commissions and $1.38-billion to the U.S. Treasury. USEC will also borrow $550-million under senior credit facilities from Bank of America, $500-million of which will also be turned over to the Treasury. (Bank of America has actually committed to lend USEC up to $700-million, according to an amended S-1 registration statement filed with the U.S. Securities & Exchange Commission July 21.)

The closing—when Treasury will formally turn over its shares in the federal U.S. Enrichment Corp. to USEC Inc.—is expected to occur on Tuesday. USEC is trading under the symbol "USU." Over 17-million shares were traded the first day, with the price for USEC stock closing at $14.25 a share.

The public trading of USEC's stock is being viewed as a "landmark" event in the nuclear fuel business and culminates years of discussions (going back to the Nixon administration) about turning the government's enrichment enterprise into a private-sector company.

Although there has not been much enthusiasm for USEC's stock from companies in the nuclear fuel business and the stocks of uranium mining companies are clearly being buffeted by the USEC privatization, some did see a positive benefit from the USEC IPO. "It will help educate a whole part of the investment community about the benefits of nuclear power. And that could help all of us in the end," said a senior official at Cameco.

Last-minute concerns about the privatization of the U.S. Enrichment Corp. and about its effects on the uranium market and the U.S.-Russian high-enriched uranium purchase agreement were brushed aside, as the USEC board, meeting July 22, confirmed that the IPO path for privatization best met the criteria in the 1996 USEC Privatization Act.

USEC CEO William Timbers and USEC Board Chairman William Rainer assured the U.S. government that USEC would "sell its uranium gradually in a flexible manner that first and foremost supports a healthy, stable market, and with a view

(continued on page 15)

USEC. The miners want the court to then order DOE to retrieve the material.

The miners said in their court filing that the determination by the secretary of energy that the transfer would not have an adverse impact on the domestic uranium industry (a determination required by the USEC Privatization Act) "was arbitrary, capricious, and improper." The miners also maintain that DOE failed to obtain fair market value from USEC for the uranium, also a requirement of the privatization act.

The miners further argue that transfer of 8,800 MTU as UF6 made by DOE to USEC in 1993 (when USEC was created) "exceeded DOE's statutory authority, which was limited to transferring only the amount necessary for the fulfillment of existing contracts. By transferring additional quantities of uranium beyond that necessary to fulfill existing contracts, DOE acted in contravention of the Energy Policy Act" of 1992.

According to USEC's S-1 registration statement, the May and June 1998 transfers were 45 metric tons of low-enriched uranium (453 MTU of equivalent UF6), 3,800 MTU as UF6, and .8 metric tons of HEU (211 MTU of UF6 equivalent). USEC valued the uranium component of the transfers at $121.6-million (NF, 13 July, 30). The transfers, USEC said, were to complete DOE's reimbursement to USEC for nuclear safety upgrade costs at the gaseous diffusion plants, the settlement of the remaining transition obligation of $19.6-million, and settlement of other receivables. Nuclear safety upgrade cost reimbursements are set at $220.0-million under the settlement of the reimbursement obligation.

That uranium, combined with other uranium transferred, gave USEC 28,609 MTU as UF6 equivalent in inventory as of June 30, or roughly 75-million lb U3O8 equivalent. That inventory doesn't include an additional 21-million lb of U3O8 equivalent that USEC may produce over the next seven years from underfeeding its gaseous diffusion plants (NF, 13 July, 1). USEC has indicated that it plans to sell all but 5,000 MTU (roughly 13-million lb U3O8 equivalent).

USEC Promises Restraint

In a July 21, 1998 letter to the State Department's John D. Holum, acting under secretary for arms control and international security and director of the U.S. Arms Control & Disarmament Agency, William J. Rainer, chariman of the USEC board, and USEC CEO Willaim Timbers told Holum:

We want to allay any concerns that have been raised in recent weeks that the privatized USEC would act to negatively affect the natural uranium market. We affirm our commitment to the HEU agreement and assure you that USEC will dispose of natural uranium in a gradual and flexible manner so that the company, as well as all participants in the global uranium marketplace, can benefit from the maintenance of a healthy uranium market.

Rational Market Participant. As a participant in the uranium market, USEC will have every incentive to ensure that its sales of natural uranium do not adversely affect market conditions, particularly prices of natural uranium. Disposing of this material incrementally over the next seven years in a flexible manner is entirely consistent with USEC's commercial interests. As a public company with fiduciary obligations to its shareholders, USEC can ill-afford to unsettle this important market.

We note that those who have expressed concern over USEC's proposed uranium sales have referred to an industry consultant's future price projections [Uranium Exchange Corp.'s "Quarterly Market Report" for July 1998] that are lower than USEC's historic cost of natural uranium. These projections [varying from $6 to $8/lb U3O8 over the next several years] are also substantially below those of other analysts. USEC simply would not sell its uranium if its actions would cause price decreases of such magnitude. Furthermore, any sales at those levels would dilute future reported earnings, which would be an outcome unacceptable to USEC or any successful private enterprise.

Market Conditions. USEC fully recognizes the importance of not disrupting the market through ill-conceived or poorly timed introductions of natural uranium, and will not hesitate to defer planned sales to help ensure a stable market. We intend to appropriately modify any of our tentative plans so as to not significantly affect pricing in the natural uranium market. To this end, the Prospectus, on page 17, cautions investors that there can be no assurance that USEC will be able to sell natural uranium in anticipated quantities. The Prospectus also provides that "the quantity of ([natural uranium]) that USEC will be able to sell in any given year...will be dependent on market conditions (including any sales by the U.S. government out of its inventory) and prices at the time...."

Most Sales to Occur After Fiscal 2000. As set forth in the Prospectus, the company does not anticipate making significant natural uranium sales until after fiscal 2000. This is, in part, because most of the world market requirements for uranium through fiscal 2000 have already been purchased under long-term contract. Any sales by USEC prior to fiscal 2000 will constitute only a small fraction of the world market. Moreover, under the company's strategic plan, USEC's sales between 2001-05 would constitute less than 10% of the world market for natural uranium. In any event, it is our intention not to sell at a price levels below those described above.

Gradual Sales. As described in the Prospectus, USEC plans to sell its natural uranium gradually, through 2005, with particular sensitivity to market conditions. To the maximum extent possible, USEC plans to implement such sales under long-term domestic and international contracts. Further, as set forth in the Prospectus, USEC expects to retain the equivalent of approximately 5,000 metric tons of natural uranium to meet ongoing operational requirements. We also note that there are certain statutory and contractual restrictions on the ability of USEC to sell its inventory. Such restrictions affect almost 60% of USEC's uranium close to $400-million to pay for the cleanup of that UF6.

legislation, which moved quickly through both the and Senate, says that the USEC depleted UF6 funds U.S. Treasury are to be set aside for one year after ation and not swept into the general funds of the easury on privatization. The bill also contains a of the Senate" resolution, saying that the Senate will iate sufficient funds in fiscal 2000 to implement the tration's cleanup plan.

—Michael Knapik, Washington

RS/SELLERS FACE UNCERTAIN MARKET

s going to be a weird market," said one analyst, plating a market complicated by possible aggressive by USEC Inc. and by a possible unraveling of any would have Russia sell the uranium feed compo- blended-down high-enriched uranium to three companies.

ht now he added it is unclear at what price a deal e concluded in the U.S.," he said. But he added that is clearly trending downward. Many analysts, to ee or another, echoed that sentiment.

r USEC filed its S-1 registration, announcing an ve uranium sales campaign, the Uranium Exchange widely discussed analysis, said that with USEC its inventory and uranium it was producing through underfeeding the gaseous diffusion plants, the price of uranium in the U.S. could drop to a range of $6-$8/lb U3O8 by the year 2000.

But USEC is promising not to sell at those prices, and it is possible that DOE may be forced to buy some of the Russian HEU feed inventory, as well as take back some of the uranium it transferred to USEC. Given this uncertainty, the best guess of a number of analysts is that the spot price in the U.S. will decline somewhat—perhaps to slightly below $10/lb over the next few months. But if potential near-term buyers—few that there are—adopt a wait-and-see strategy at these new levels, some sellers, with a need for cash, may cut the price further.

In this uncertain market, some analysts also see more and more off-market deals being struck as buyers and sellers try to reach an accommodation that seems reasonable to both.

In NuclearFuel's judgment, significant open-market transactions in the U.S. during the forward two-week period could be concluded within the range of $9.90-$10.40/lb U3O8, a decrease in the range reported two weeks ago of $10.30-$10.70/lb. So-called unrestricted buyers, those able to use uranium from the Commonwealth of Independent States (CIS), could probably conclude a deal within the range of $8.80-$9.10/lb, a decrease in the range reported two weeks ago of $9.00-$9.20.

Virginia Power is said to have received bids from over a dozen different suppliers. The utility was looking for offers for 500,000 lb/yr of U3O8 over the period 2000-2004.*—Michael Knapik, Washington*

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Exhibit BB

URANIUM RESOURCES INC. 3RD QUARTER 1998 FINANCIAL REPORT
FORM 10-Q, U.S. SECURITIES AND EXCHANGE COMMISSION
FILED NOVEMBER 16, 1998


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          STD. IND. CLASS.:       WHOLESALE-METALS, MINERALS (NO PETROLEUM)
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          STATE OF INCORPORATION: DE
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SEQUENCE	1
DESCRIPTION	FORM 10-Q FOR QUARTER ENDED SEPTEMBER 30, 1998

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10-Q

X Quarterly report pursuant to Section 13 or 15(d) of the
--- Securities Exchange Act of 1934

For the quarterly period ended September 30, 1998 or

Transition report pursuant to Section 13 or 15(d) of the
--- Securities Exchange Act of 1934

For the transition period from ---------- to ----------

Commission file number 0-17171

URANIUM RESOURCES, INC.
(exact name of Registrant as specified in its Charter)

DELAWARE	75-2212772
(State of Incorporation)	(I.R.S. Employer Identification No.)

12750 MERIT DRIVE, SUITE 1020, DALLAS, TEXAS 75251
(Address of principal executive offices, including zip code)

(972) 387-7777
(Registrant's telephone number, including area code)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes X No

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date.

Title of Each Class of Common Stock	Number of Shares Outstanding
Common Stock, $.001 par value	12,053,027 as of November 12, 1998

URANIUM RESOURCES, INC.
1998 THIRD QUARTERLY REPORT ON FORM 10-Q

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PART I - FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS

URANIUM RESOURCES, INC.

CONSOLIDATED BALANCE SHEETS
SEPTEMBER 30, 1998 AND DECEMBER 31, 1997 (NOTE 1)

ASSETS

	September 30, 1998 (Unaudited)	December 31, 1997
Current assets:		
Cash and cash equivalents	$ 978,515	$ 2,325,158
Short-term investment:		
Certificate of deposit, restricted	3,561,963	3,304,195
Receivables, net	3,293,569	4,507,090
Uranium inventory	2,431,414	2,260,200
Materials and supplies inventory	98,977	91,047
Prepaid and other current assets	173,885	253,910
Total current assets	10,538,323	12,741,600
Property, plant and equipment, at cost:		
Uranium properties	102,533,163	97,100,015
Other property, plant and equipment	538,973	580,676
Less-accumulated depreciation and depletion	(58,513,873)	(36,235,274)
Net property, plant and equipment	44,558,263	61,445,417
Other assets	561,702	676,952
	$ 55,658,288	$ 74,863,969

The accompanying notes to financial statements are an integral part of these consolidated balance sheets.

URANIUM RESOURCES, INC.

CONSOLIDATED BALANCE SHEETS
SEPTEMBER 30, 1998 AND DECEMBER 31, 1997 (NOTE 1)

LIABILITIES AND SHAREHOLDERS' EQUITY

	September 30, 1998 (Unaudited)	December 31, 1997
Current liabilities:		
Accounts payable	$ 1,287,041	$ 3,233,277
Notes payable	3,835,000	1,950,000
Accrued interest payable	2,179	5,035
Current portion of long-term debt	8,000	7,000
Royalties payable	606,220	630,284
Current portion of restoration reserve	381,000	511,000
Other accrued liabilities	369,456	405,814
Total current liabilities	6,488,896	6,742,410
Other long-term liabilities and deferred credits	5,416,569	4,787,427
Long-term debt, less current portion	6,144,227	
Deferred federal income taxes	1,066,810	4,967,000
Shareholders' equity:		
Common stock, $.001 par value, shares authorized: 25,000,000 shares issued and outstanding (net of treasury shares): 1998 - 12,053,027 1997 - 12,053,027	12,205	12,205
Paid-in capital	40,629,923	40,222,359
Retained earnings (accumulated deficit)	(4,090,924)	11,679,643
Less: Treasury stock (152,500 shares), at cost	(9,418)	(9,418)
Total shareholders' equity	36,541,786	51,904,789
	$ 55,658,288	$ 74,863,969

The accompanying notes to financial statements are an integral part of these consolidated balance sheets.

URANIUM RESOURCES, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS
FOR THE NINE MONTHS AND THREE MONTHS ENDED SEPTEMBER 30, 1998 AND 1997 (NOTE 1)
(UNAUDITED)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	1998	1997	1998	1997
Revenues:				
Uranium sales -				
Produced uranium	$ 2,579,457	$ 5,297,730	$ 8,689,883	$ 12,278,910
Purchased uranium	1,924,100	4,201,550	4,321,400	4,204,963
Uranium sales	4,503,557	9,499,280	13,011,283	[illegible]6,483,873
Costs and expenses:				
Cost of uranium sales -				
Direct cost of purchased uranium	1,574,701	3,505,489	3,591,371	3,505,489
Royalties	132,345	292,977	407,862	683,525
Operating expenses	1,358,149	3,156,980	3,979,050	5,645,615
Provision for restoration and reclamation costs	165,818	424,840	493,252	864,343
Depreciation and depletion	1,357,225	2,926,816	4,426,509	6,261,738
Writedown of uranium properties and other assets	18,034,694	--	18,034,694	--
Total cost of uranium sales	22,622,932	10,307,102	30,932,738	16,960,710
Loss from operations before corporate expenses	(18,119,375)	(807,822)	(17,921,455)	(476,837)
Corporate expenses -				
General and administrative	530,978	744,313	1,806,461	2,236,225
Depreciation	4,966	5,749	14,698	17,410
Total corporate expenses	535,944	750,062	1,821,159	2,253,635
Loss from operations	(18,655,319)	(1,557,884)	(19,742,614)	(2,730,472)
Other income (expense):				
Interest expense, net of capitalized interest	(37,863)	(34,391)	(114,270)	(134,013)
Interest and other income, net	47,513	75,462	144,317	932,754
Total other income	9,650	41,071	30,047	798,741

Loss before federal income taxes	(18,645,669)	(1,516,813)	(19,712,567)	(1,931,731)
Federal income tax benefit:				
Current	--	--	--	(225)
Deferred	(3,730,000)	(303,000)	(3,942,000)	(386,000)
Net loss	$(14,915,669)	$ (1,213,813)	$(15,770,567)	$ (1,545,506)
Net loss per common share and common equivalent (basic and diluted)	$ (1.24)	$ (0.10)	$ (1.31)	$ (0.13)
Weighted average common shares and common equivalent shares per share data				
Basic	12,053,027	12,028,288	12,053,027	11,661,904
Diluted	12,053,027	12,028,288	12,053,027	11,661,904

The accompanying notes to financial statements are an integral part of these consolidated statements.

URANIUM RESOURCES, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
FOR THE NINE MONTHS ENDED SEPTEMBER 30, 1998 AND 1997 (NOTE 1)
(UNAUDITED)

	September 30, 1998	September 30, 1997
Cash flows from operations:		
Net loss	$(15,770,567)	$ (1,545,506)
Reconciliation of net income to cash provided by operations-		
Provision for restoration and reclamation costs	493,252	864,343
Depreciation and depletion	4,441,207	6,279,148
Writedown of uranium properties and other assets	18,034,694	
Credit for deferred income taxes	(3,942,000)	(386,000)
Decrease in restoration and reclamation accrual	(23,891)	(292,443)
Other non-cash items, net	528,549	69,966
Cash flow provided by operations, before changes in operating working capital items	3,761,244	4,989,508
Effect of changes in operating working capital items-		
(Increase) decrease in receivables	1,213,521	(4,096,442)
(Increase) decrease in inventories	(170,220)	478,976
Increase in prepaid and other current assets	(219,030)	(357,758)
Increase (decrease) in payables and accrued liabilities	(2,009,514)	958,916
Net cash provided by operations	2,576,001	1,973,200
Investing activities:		
Increase in investments	(257,768)	(440,292)
Additions to property, plant and equipment -		
Kingsville Dome	(2,974,452)	(7,241,321)
Rosita	(227,218)	(1,896,291)
Vasquez	(427,271)	(157,265)
Alta Mesa	(55,103)	(210,157)
Churchrock	(833,416)	(607,060)
Crownpoint	(594,670)	(845,732)
Other property	(405,672)	(309,726)
Increase in other assets	(26,752)	(20,472)
Net cash used in investing activities	(5,802,322)	(11,728,316)
Financing activities:		
Payments and refinancings of principal	(5,455,322)	(6,170,992)
Proceeds from borrowings	7,335,000	--
Issuance of common stock and warrants, net	--	87,399
Net cash from (used in) financing activities	1,879,678	(6,083,593)
Net decrease in cash and cash equivalents	(1,346,643)	(15,838,709)
Cash and cash equivalents, beginning of period	2,325,158	16,934,276
Cash and cash equivalents, end of period	$ 978,515	$ 1,095,567

The accompanying notes* to financial statements are an integral part of these consolidated statements.

[*NOTES TO CONSOLIDATED FINANCIAL STATEMENTS WERE MISSING FROM VERSION OF THIS REPORT DOWNLOADED BY SEC-EDGAR DATABASE.]

1. BASIS OF PRESENTATION

The accompanying unaudited consolidated financial statements have been prepared in accordance with generally accepted accounting principles for interim financial information and with the instructions to Form 10-Q and Rule 10-01 of Regulation S-X. Accordingly, they do not include all of the information and footnotes required by generally accepted accounting principles for complete financial statements. The accompanying statements should be read in conjunction with the audited financial statements included in the Company's 1997 Annual Report on Form 10-K. In the opinion of management, all adjustments (consisting of normal recurring accruals) considered necessary for a fair presentation have been included. Operating results for the three months ended September 30, 1998 are not necessarily indicative of the results that may be expected for the full calendar year ending December 31, 1998.

2. LONG-TERM DEBT

EXTENSION OF NOTE TERMS

In March 1998, the Company entered into an agreement to extend the maturity date from May 31, 1998 to May 31, 2000 on the $6,000,000 secured convertible note that was issued to mutual funds managed by Ryback Management Company. The note is convertible into shares of the Company's common stock. In exchange for the extension in the term of the note, the conversion price was adjusted from $4.00 per share to $3.00 per share. In the same transaction, the exercise price for warrants held by the lenders to purchase 1,000,000 shares of the Company's common stock has also been adjusted from $4.00 to $3.00 per share, and the expiration date of the warrants has been extended from May 31, 1998 to May 31, 2000. In connection with this transaction the Company allocated $408,000 for the value of the warrants resulting in an effective rate of 10% on the refinanced note.

CAPITALIZED INTEREST

Interest capitalized in the nine months ended September 30, 1998 and 1997 was $497,000 and $265,000, respectively. Total interest costs in these periods were $611,000 and $399,000, respectively.

3. URANIUM INVENTORY

Uranium inventory consists of uranium concentrates (U3O8) located at the Company's Rosita and Kingsville Dome sites and also at converters awaiting delivery to customers. All uranium inventories are valued at the lower of cost (first-in, first-out) or market. In the first nine months of 1998, the Company reduced the carrying value of its uranium inventory by $1,304,000 reflecting an adjustment to the lower of its cost or market value. This adjustment increased operating expenses by $852,000 and depreciation and depletion by $452,000 in

the
first nine months of 1998. The lower of cost or market value adjustment for the
third quarter of 1998 was $463,000 and resulted in an increase to operating expenses of $362,000 and depreciation and depletion of $101,000.

4. WRITEDOWN OF URANIUM PROPERTIES

The Company's ability to recover its investment in its uranium properties is dependent upon a number of factors, including, the sales price of uranium, the Company's ability to deliver profitable uranium production to its existing and future sales contracts and the Company's ability to finance the capital costs necessary to develop and produce future projects. The market price of uranium has been volatile in recent years and is currently below the Company's current cost of uranium production.

In view of the continuing weakness in uranium prices, the Company has completed a review of the carrying values of its uranium properties and has determined that a writedown was required at September 30, 1998 with respect to its existing producing properties of approximately $18,000,000. The writedown was recorded as a non-cash charge against earnings in the third quarter of 1998. The writedown in the carrying value of the Kingsville Dome and Rosita properties totaled $12,300,000 and $5,600,000, respectively. The net carrying value of these properties at September 30, 1998 (after giving effect to the writedown) was approximately $6,500,000 for Kingsville Dome and $900,000 for Rosita.

The review utilized a number of estimates and assumptions, including current and projected uranium prices (which assumes higher prices in the future) and the timing and costs of future production activities. The estimates also assume that the Company is able to operate each of its production sites in the future at production rates that are higher than the Company's production rate for the first nine months of 1998 and as a result operate at costs that are significantly below those experienced for the first nine months of 1998. The inability of the Company to achieve such assumptions would have an impact on the Company's ability to recover its current and future investments in its uranium properties.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS
OF OPERATIONS

Forward Looking Statements

This Item 2 contains "forward-looking statements" which are made pursuant to the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements include, without limitation, statements relating to liquidity, financing of operations, continued volatility of uranium prices, estimates of future capital expenditures, proved undeveloped reserves and other
such matters. The words "believes," "expects," "projects," "targets," or

"estimates" and similar expressions identify forward-looking statements. The Company does not undertake to update, revise or correct any of the forward-looking information. Readers are cautioned that such forward-looking statements should be read in conjunction with the Company's disclosures under the heading: "Cautionary Statement for the Purposes of the 'Safe Harbor' Provisions of the Private Securities Litigation Reform Act of 1995" in the Company's 1997 Annual Report on Form 10-K.

CAPITAL RESOURCES AND LIQUIDITY

Operating Cash Flows and Liquidity

For the quarter ended September 30, 1998, the Company's cash and cash equivalents were $979,000 a decrease of $515,000 as compared to a decrease of $2,761,000 for the third quarter of 1997. Cash and cash equivalents decreased by
$1,347,000 for the nine months ended September 30, 1998 compared to a decrease of $15,839,000 for the same period of 1997. The Company's uranium operations generated a negative cash flow from operations of $1,751,000 for the quarter ended September 30, 1998, in comparison to a cash flow from operations in the same period in 1997 of $1,839,000. Net cash provided by uranium operations for the nine months ended September 30, 1998 was $2,576,000 compared to cash flow from operations of $1,973,000 for the same period in 1997. The Company's net working capital at September 30, 1998 was $4,049,000.

As a result of the continued decline in uranium prices, the Company has begun plans to shut-in and place on stand-by its two South Texas facilities by the end of this year or the first quarter of 1999. The Company will continue to maintain certain activities at these locations including its ongoing groundwater restoration efforts. The Company has also begun implementing additional steps for the remainder of 1998 and 1999 to preserve cash by reducing expenses and maximizing the cash flow from its existing sales contracts. The Company has agreed to accelerate the 1999 delivery under one its contracts to December of this year.

The Company is consolidating certain of its administrative locations, and reducing its workforce. Additional measures are planned to be implemented in 1999. The Company projects that upon the implementation of these strategies it will be able to maintain a continued positive liquidity position through at least 1999. However, there can be no assurances that the Company will be able to
fully implement these strategies. If certain of these strategies cannot be implemented and if alternative options are not available, the Company's operations and liquidity would be negatively impacted.

Investing Cash Flows

South Texas Projects

During the nine months ending September 30, 1998, development expenditures totaling $2,974,000 and $227,000 were incurred at the Company's Kingsville Dome and Rosita sites, respectively. The expenditures at the Kingsville Dome project were primarily for development of new wellfields in PAA #3 and on the acquisition and construction of the new remote ion exchange plants to be used in production from PAA #3.

Capital expenditures incurred at the Vasquez project for the nine months ended September 30, 1998 were $427,000 and were related primarily to the completion of permitting and licensing activities. Capital expenditures incurred on the Alta Mesa project for the nine months ended September 30, 1998 were minimal and were related primarily to permitting and licensing activities. The Company expects to fund its 1998 operating and capital expenditures at its Kingsville Dome, Rosita, Vasquez and Alta Mesa projects from cash on hand, sales proceeds under its 1998 uranium deliveries and through existing financing arrangements. The Kingsville and Rosita projects will be placed on stand-by and future development at the Company's South Texas properties will be dependent upon uranium prices and the availability of capital. (See "Dependence on Uranium Prices" and "Impact of Uranium Price Declines").

New Mexico Projects

Capital expenditures at the Company's Churchrock and Crownpoint projects for permitting and land holding costs totaled approximately $1,428,000 for the nine months ending September 30, 1998 compared to costs of $1,453,000 for the same period in 1997. Continued permitting and land holding costs for 1998 and 1999 are projected to be minimal and are expected to be met through operations.
Future development of these properties will be dependent on uranium prices and the availability of capital. (See "Dependence on Uranium Prices" and "Impact of Uranium Price Declines").

Financing Cash Flows

In May 1996, the Company entered into a $3.0 million revolving credit facility. This facility was renewed and expanded for a two year term to a $5.0 million credit facility in July 1997. This facility is secured by the Company's uranium inventory and/or by receivables from its uranium sales contracts. Principal and interest payments under the loan are due monthly, with interest on the loan accruing at the prime rate plus 1%. Borrowings under this facility at September 30, 1998 totaled $3,835,000.

In June 1996, the Company received $4.0 million in proceeds from the one-year note entered into with the Lindner Dividend Fund. The terms of the note provided for the payment of both the principal and accrued interest by June 1997 with interest on the note accruing at a rate of 6.5% per annum. The $4.0 million principal amount and accrued interest on this note was paid in January 1997.

The Company was obligated to pay a production payment royalty of $1.00 per pound on the first three million pounds of uranium produced and sold from either Kingsville Dome or Rosita. The Company has cumulatively produced in excess of three million pounds of uranium from these properties and made the final payment of approximately $730,000 on this obligation in January 1997.

In the first nine months of 1997 the Company generated $87,000 from the issuance of 25,500 shares of common stock associated with the exercise of certain stock warrants.

Other Non-Cash Transactions

In March 1997, the Company acquired from Santa Fe Pacific Gold Corporation ("Santa Fe") certain mineral interests covering approximately 500,000 acres in northwestern New Mexico in exchange for 1.2 million shares of the Company's common stock and a commitment for certain exploration expenditures. Approximately one-third of the acreage comprises uranium mineral rights and the remaining acreage comprises exploration rights with rights to purchase and develop any uranium mineral interests found. Included in the purchase is an existing royalty obligation from the Company to Santa Fe on certain properties currently under lease from Santa Fe. The Company estimates that there is approximately 14.7 million pounds of proven in-place uranium reserves on 37,000 acres of the property on which it acquired the entire mineral estate (excluding coal). Also included in the 500,000 acres is the fee interest in uranium on approximately 140,000 acres and the exclusive uranium rights, for 17 years, on approximately 346,000 acres.

DEPENDENCE ON URANIUM PRICES

The Company's operations are dependent on the price of uranium and its relationship to the Company's cost of production. Historically, uranium prices have demonstrated significant volatility and have been and will continue to be affected by factors outside of the Company's control.

The most recent factor which has had a significant impact on the uranium industry and on uranium prices was the privatization by the U.S. Government of United States Enrichment Corp. ("USEC") (the entity which produces and sells uranium fuel enrichment services for commercial nuclear power plants and natural uranium) and the disclosure of substantial uranium inventories held by USEC which could be available for sale into the uranium market. USEC has disclosed that it holds approximately 75 million pounds of uranium and uranium equivalent products of which some 33 million pounds may have been transferred to USEC by the United States Department of Energy over and above what was provided for in the USEC Privatization Act of 1996. Since the date USEC disclosures were announced the spot price of uranium has declined 16%, from $10.90 to the current price of $9.15 per pound.

IMPACT OF URANIUM PRICE DECLINES

While the ultimate impact and timing to the uranium markets of the USEC privatization and the potential disposition of their newly disclosed uranium inventory levels is uncertain, there is potential for this event along with the ultimate disposition of the highly enriched Russian uranium and U.S. Government uranium stockpiles to continue to depress uranium prices or to inhibit prices from rising to higher levels over the next several years. The prospect of potentially depressed uranium prices for continued periods could adversely impact the Company's ability to secure additional long-term sales contracts at prices that exceed the Company's overall costs.

The market price of uranium has fallen to levels that are currently below the Company's cost of uranium production. The outlook for uranium prices through the end of 1999 indicates that a price rebound during this period is not likely.

In order for the Company to maximize the existing and future cash flow projected from its existing sales contracts and in light of the Company's current operating position, its uranium sales contract portfolio and the current and projected uranium market prices, a number of decisions have been made regarding the Company's operating plans for 1999. The Company will satisfy the delivery requirements under its remaining 1998 and 1999 sales contracts through its existing inventory position and by taking advantage of the low uranium prices and arbitraging its contractual position in the market. The production operations in South Texas at the Kingsville Dome and Rosita facilities will be shut-in and placed on stand-by once inventory levels have been achieved that meet the Company's 1998 and 1999 "produced pound" contractual requirements. This timing is expected to occur in the fourth quarter of this year or the first quarter of 1999. The re-commencement of production at Kingsville and Rosita will be dependent upon a recovery of uranium prices to profitable levels and the Company's ability to obtain the necessary capital to finance further development of these projects. While on stand-by, the Company will continue to maintain certain activities at these locations including its ongoing restoration efforts.

In connection with the shut-in of production, the Company will be making additional cost reductions at all levels. These cost savings will include the consolidation of certain administrative locations, personnel reductions in both its operating and its general and administrative workforce and reductions in compensation for the Company's executive management.

The Company continues to evaluate its core uranium assets in Texas and New Mexico in order to optimize the value of these assets to the Company. Possible alternatives for these uranium assets may include the sale or joint venturing of certain of these projects or the termination of the Company's rights for those properties whose holding costs are determined to be in excess of their expected value.

The Company has entered into discussions with a number of domestic and international uranium production companies regarding the divestiture of all or a portion of the Company or its assets. The discussions regarding a possible merger or acquisition of the Company as a whole, have occurred over the past several months, have not to date resulted in an expression of interest. However, the communication has resulted in certain of these uranium production companies expressing an interest in certain of the Company's projects and assets. These discussions are currently in their preliminary stage and no assurance can be given that such discussions will proceed or will result in an agreement.

WRITEDOWN OF URANIUM PROPERTIES

In view of the continuing weakness in uranium prices, the Company has completed a review of the carrying values of its uranium properties and has determined that a writedown was required at September 30, 1998 with respect to its existing producing properties of approximately $18,000,000. The writedown was recorded as a non-cash charge against earnings in the third quarter of 1998. The writedown of the carrying value of the Kingsville Dome and Rosita properties totaled $12,300,000 and $5,600,000, respectively. The net carrying value of these properties at September 30, 1998 (after giving effect to the writedown) was approximately $6,500,000 for Kingsville Dome and $900,000 for Rosita.

The review utilized a number of estimates and assumptions, including current and projected uranium prices (which assumes higher prices in the future) and the timing and costs of future production activities. The estimates also assume that the Company is able to operate each of its production sites in the future at production rates that are higher than the Company's production rate for the first nine months of 1998 and as a result operate at costs that are significantly below those experienced for the first nine months of 1998. The inability of the Company to achieve such assumptions would have an impact on the Company's ability to recover its current and future investments in its uranium properties.

ENVIRONMENTAL ASPECTS

The Company utilizes ISL solution mining technology as its only mining method. Unlike conventional uranium mining companies, the Company's mining technology does not create "tailings". Nevertheless, the Company is highly regulated. Its primary environmental costs to date have been related to obtaining and complying with environmental mining permits and, once mining is completed, the reclamation and restoration of the surface areas and underground water quality to a condition consistent with applicable requirements. Accruals for the estimated future cost of such activities are made on a per-pound basis as part of production costs. See the Consolidated Statements of Operations for the applicable provisions for such future costs. See also Note 1 - "Restoration and Reclamation Costs" of Notes to Consolidated Financial Statements in the Company's Form 10-K as of December 31, 1997.

RESULTS OF OPERATIONS

Revenues, earnings from operations and net income for the Company can fluctuate significantly on a quarter to quarter basis during the year because of the timing of deliveries requested by its utility customers. The Company's customers have generally elected, where possible, to take delivery of the bulk of the annual deliveries under their long-term sales contracts later in each year. Accordingly, operating results for any quarter or year-to-date period are not necessarily comparable and may not be indicative of the results which may be expected for future quarters or for the entire year.

The Company recorded a writedown of the carrying value of certain of its uranium properties in the third quarter of 1998. (See "Writedown of Uranium Properties".)

Three Months and Nine Months Ended September 30, 1998 and 1997

The following is a summary of the key operational and financial statistics
related to the Results of Operations:

	Three Months Ended September 30,		Three Months Ended September 30,	
	1998	1997	1998	1997
	(In thousands, except per share data)			
Uranium sales revenues (1)	$ 4,504	$ 9,499	$ 13,011	$ 16,484
Total pounds delivered	328	730	860	1165
Average sales price/pound (2)	$ 15.00	$ 14.62	$ 15.66	$ 15.30
Pounds produced	162	165	519	588
Pounds purchased	160	415	360	415
Average production cost of produced pounds	$ 16.69	$ 16.66	$ 17.23	$ 16.47
Average cost of purchased pounds	$ 9.84	$ 9.93	$ 10.29	$ 9.93
Average cost of produced pounds sold (3)	$ 14.35	$ 17.17	$ 14.85	$ 15.66
Average cost of purchased pounds sold	$ 9.84	$ 9.86	$ 10.29	$ 9.86

(1) Revenues for the three and nine months ended September 30, 1998 include approximately $655,000 for the sales of Russian uranium sold under the Matched Sales Amendment. The same periods in 1997 include approximately $2.8 million in revenue from sales of similar Russian material.

(2) Average sales price does not include the sale of Russian material which is considered as a "pass through" sale under the Matched Sales Amendment.

(3) Per pound costs in 1998 exclude adjustments made in the three months and nine months ended September 30, 1998 to reduce the carrying value of the Company's uranium inventory to the lower of its cost or market value by approximately $463,000 and $1,304,000, respectively.

Revenue from uranium sales in the third quarter of 1998 decreased by $4,996,000 from 1997 amounts. The average sales price for total uranium deliveries in the third quarter ending September 30, 1998 and 1997 was $15.00 per pound and $14.62 per pound, respectively (excluding the effect of the

"pass
through" sales under the Company's Matched Sales program.) Total uranium deliveries in the third quarter of 1998 of 328,000 pounds was 402,000 pounds lower than those made in the same period in 1997.

Revenue from uranium sales in the first nine months of 1998 decreased by $3,473,000 from 1997 levels. The average sales price for total uranium deliveries in the first nine months of 1998 and 1997 was $15.66 per pound and $15.30 per pound, respectively. Total uranium deliveries in the first nine months of 1998 of 519,000 pounds was 69,000 pounds lower than those made in the
same period in 1997.

Details of the cost of uranium sales were as follows:

	Three Months Ended September 30,		Three Months Ended September 30,	
	1998	1997	1998	1997
	(In thousands)		(In thousands)	
Cost of produced uranium	$ 1,575	$ 3,505	$ 3,591	$ 3,505
Royalties	$ 132	$ 293	$ 408	$ 684
Operating expenses	$ 1,358	$ 3,157	$ 3,979	$ 5,646
Provision for restoration and reclamation costs	$ 166	$ 425	$ 493	$ 864
Depreciation and depletion of uranium properties	$ 1,357	$ 2,927	$ 4,427	$ 6,262
Total cost of uranium sales	$ 4,588	$ 10,307	$ 12,898	$ 16,961

The Company produced 162,000 pounds of uranium from the Rosita and Kingsville Dome facilities in the three months ending September 30, 1998, compared to 165,000 pounds in the same quarter of 1997. The average per pound production cost for the third quarter of 1998 was $16.69, compared to $16.66 in
the same quarter in 1997.

For the nine month period ending September 30, 1998, the Company produced 519,000 pounds compared to 588,000 pounds in the same period during 1997. The average per pound production cost for the first nine months of 1998 was $17.23 compared to $16.47 in the same period in 1997.

In January 1998, the Company received the necessary regulatory permits at Kingsville Dome to expand its production into PAA #3, located northwest of the current production fields. This new production area is expected to contain approximately 2.0 million in-place pounds (70% of which are projected to be produced). Production in the first wellfield commenced in June 1998. Beginning with the first wellfield in PAA #3, the Company has implemented new operating techniques utilizing a remote ion exchange plant concept. This change in technique has demonstrated an increased production efficiency and is expected to reduce overall production costs, however, there can be no assurance that such positive results will be sustainable over the Company's future wellfields.

Operating expenses attributable directly to the sale of Kingsville Dome and Rosita produced pounds totaled $3,127,000 ($6.12 per pound) in the first nine months ended September 30, 1998 compared to $5,646,000 ($6.98 per pound) for Kingsville Dome and Rosita produced pounds that were sold in the same period in 1997.

The provision for restoration and reclamation in the first nine months ended September 30, 1998 consists of $482,000 ($0.94 per pound) for production sold during 1998 and $11,700 for costs associated with reclamation activities related to the Benavides project (a previous mining location). The provision for restoration and reclamation in the nine months ended September 30, 1997 consists of $765,000 ($0.95 per pound) for production sold and $99,700 for costs associated with reclamation at the Benavides project.

The depreciation and depletion provision in the nine months ended September 30, 1998 consisted of $3,974,000 ($7.78 per pound) for Rosita and Kingsville Dome production sold. The depreciation and depletion provision in the first nine months of 1997 consisted of $6,262,000 ($7.74 per pound) for Rosita and Kingsville Dome production sold.

In the first nine months of 1998, the Company reduced the carrying value of its uranium inventory by $1,304,000 reflecting an adjustment to the lower of its cost or market value. This adjustment increased operating expenses by $852,000 and depreciation and depletion by $452,000 in the first nine months of 1998. The lower of cost or market value adjustment for the third quarter of 1998 was $463,000. This adjustment increased operating expenses by $362,000 and depreciation and depletion by $101,000 in the third quarter of 1998.

Royalty expenses in the first nine months of 1998 totaled $408,000 compared to $684,000 in 1997. The decrease in 1998 is directly attributable to the reduction in sales of produced uranium and a lower spot market price compared to 1997.

The average cost of uranium purchases made in the first nine months of 1998 was $10.29 compared to $9.93 for the same period in 1997. Total deliveries in

the first nine months of 1998 consisted of 511,000 produced pounds at an average
cost per pound of $14.85 and 349,000 purchased pounds at a cost of $10.29 per pound. During the same period in 1997, the Company delivered 809,000 produced pounds, at an average cost per pound of $15.66 and 355,000 purchased pounds at an average cost per pound of $9.86.

Corporate expenses consisting of general and administrative ("G&A") expenses decreased to $1,806,000 in the first nine months of 1998 from $2,236,000 in the first nine months of 1997. This reduction resulted primarily from employee incentive awards paid in the first nine months of 1997 of $170,000
compared to $4,000 in 1998 and a reduction in labor costs of $266,000.

Total other income for the first nine months of 1998 decreased by $769,000
from the same period in 1997. This change resulted from the settlement in June 1997 of the Company's lawsuit against The Professional Bank of Denver, Colorado
($575,000) and from lower interest income and was offset by a reduction in net interest of $213,000 and $20,000 respectively for the first nine months of 1998.
The lower interest income resulted from reductions in average available cash and
investment balances which were generated from the Company's equity placement in
December 1996.

YEAR 2000 READINESS

The Company currently utilizes computer software in the management of its operations and in accounting for its operating results that could be affected by
the date change in the year 2000 (the "Y2K issue"). All critical information technology software and systems utilized by the Company has been purchased from
and are supported by third party vendors. The Company has conducted a review of
the potential impact of the year 2000 on such systems, and believes that it will
not encounter significant operational or financial costs related to compliance with this issue.

The Y2K issue also involves the impact of the date change in the year 2000
on machines and process controls which may utilize embedded technology as a part
of their components. The Company relies on certain non-information technology systems such as telephones, facsimile machines, and other equipment which may have embedded technology such as microprocessors, which may or may not be year 2000 compliant. The assessment of this technology is outside of the Company's control and such technology could adversely affect the Company's ability to conduct business. Management believes any such disruption is not likely to have

a significant effect on the Company's financial position or operations.

The Company may also be impacted by the Y2K issues of certain of the Company's third-party suppliers and its customers. The third-party suppliers, vendors, and customers area is currently in the assessment phase. Formal communications have been initiated with the Company's vendors, customers and others with whom the Company has significant business relationships. The Company continues to evaluate responses and make additional inquiries as needed. As the Company is in the process of collecting this information from third parties, management cannot currently determine whether third party compliance issues will materially affect its operations. However, the Company is not currently aware of any third party issues that would cause a significant business disruption. Management anticipates a complete evaluation to conclude by the end of the second quarter 1999.

PART II - OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

None.

ITEM 2. CHANGES IN SECURITIES.

None.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES.

None

ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS.

None.

ITEM 5. OTHER INFORMATION.

None.

ITEM 6. EXHIBITS AND REPORTS ON FORM 8-K.

Report on Form 8-K was filed October 27, 1998.
Item 5 Other Events

Financial Data Schedule

INDEX TO EXHIBITS

EXHIBIT	DESCRIPTION
27	FINANCIAL DATA SCHEDULE

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SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

URANIUM RESOURCES, INC.

Dated: November 16, 1998

By: /S/ Paul K. Willmott

Paul K. Willmott

Director, President and

Chief Executive Officer

Dated: November 16, 1998

By: /S/ Thomas H. Ehrlich

Thomas H. Ehrlich

Vice President - Finance and

Chief Financial Officer

(Principal Financial and Accounting Officer)

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-----END PRIVACY-ENHANCED MESSAGE-----

Exhibit CC

ATI/PKI/QVCr/FK

Footnote 44

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 19—September 21, 1998

HIGHLIGHTS

Enrichment:
• USEC uninterested in ASP program for gaseous diffusion plants —*page 9*

Fuel:
• Germany's NCS backs new company staffed by ex-Edlow employees —*page 2*

• European fabrication prices fall as more competition forces changes —*page 14*

Fuel Cycle:
• Authorities measure radiation doses rail workers near La Hague received —*page 11*

Nonproliferation:
• Smuggled HEU seized in Germany, Prague came from Mayak stockpile, police say —*page 3*

Uranium:
• Uranium firms, state regulators air worries in NRC meetings —*page 7*

• Commission stresses jurisdiction limits, says NRC lacks 'roving mandate' —*page 9*

Waste Management:
• TN West becomes first cask vendor with certified dual-purpose canister —*page 2*

• NRC commission approves procedure to speed up cask certification process —*page 2*

• BNFL bid on Westinghouse knocked it out of running for Chernobyl project —*page 7*

• BMU, Merkel hold French casks responsible for contamination —*page 10*

Weapons:
• DOE says it is not skewing review of tritium production options —*page 4*

LITTLE PROGRESS MADE ON HEU FEED DEAL; MINERS, USEC CHALLENGE KAZAK AMENDMENT

The future of any deal between Russia and three Western companies for the sale of the uranium feed component of blended-down warhead high-enriched uranium remains very much up in the air. A meeting of the parties in London earlier this month did not produce anything more than perhaps a better understanding of each side's position.

In light of new market conditions created by the planned sales of uranium from USEC Inc.'s considerable stockpile (which may be even larger, according to some sources, than has been disclosed so far), the question is, one source asked: Are the Russians willing to share some of the risks of the sale of this material? And how long will it take them to realize that they may need to show some flexibility here?

even larger

The Russian side has apparently gotten agreement within the Russian government to sell the feed at a price of $29 a kilogram uranium as UF6. But the Western companies—Cameco, Cogema, and Nukem—say they can no longer pay that

(continued on page 16)

HOW LOUD WILL MONEY TALK DURING NEXT YEAR'S NUCLEAR WASTE DEBATE?

Which comes first, spent fuel storage or disposal?

What seems like a simple question could, in fact, be anything but when Congress tackles the issue again next year of what to do about the spent fuel accumulating at commercial reactors around the country. This time, however, the projected cost of a dual-track DOE nuclear waste program could be an even bigger concern as program options are weighed, and some sources are predicting a five- to 10-year delay in the disposal effort.

Repository operations are slated to begin in 2010, though some observers maintain that 2015 might be a more realistic date. At DOE, however, Jeff Williams, the waste program's director of systems engineering, said the 2010 date for repository operations is firm.

DOE budget projections, submitted to the House Commerce Committee last year, predict that budget requirements for DOE

(continued on page 5)

A Publication of The McGraw-Hill Companies

that it will not come up with additional funds to rescue any deal between the Russians and the Western companies. That was the message that Robert Civiak of the White House's Office of Management & Budget said he conveyed in various conversations he had while attending the Uranium Institute's meeting in London.

But the U.S. government has apparently made some overtures to USEC to specify in more detail how USEC plans to sell its uranium—something more than just a statement to make such sales in "a responsible manner." USEC, however, is reluctant to agree to suchan idea and believes that the U.S. can no longer make such demands, now that USEC is a publicly traded company.

Valentin Ivanov, the new first deputy minister of the Russian Ministry of Atomic Energy (Minatom), and Vladimir Vinogradov, a deputy minister in Minatom, led the Russian delegation negotiating with the Western companies. At a press conference, Ivanov acknowledged that the feed issue was a "serious problem" that had been elevated to the top of the list of issues at the recent Clinton-Yeltsin summit. He said that Moscow had been promised "some support" by U.S. officials and that progress reports would be filed with the presidents of both countries.

At the London negotiating session, sources said, the Russians promised to report back to Minatom head Yevgeny Adamov, who would then likely get in touch with Energy Secretary Bill Richardson.

In The Antidumping Cases . . .

There appears to have been little, if any, progress made in London earlier this month to finalize an amendment to the U.S.-Kazakstan suspension agreement to allow the import into the U.S. of 20 metric tons of enriched uranium product (EUP) for processing by General Electric and then reexport. The complex transaction could end up resulting in multiple streams of deconverted material, but only the broadest outlines of the transaction have been revealed in the public filings. The ad hoc group of U.S. uranium miners and USEC Inc. have objected to the amendment.

There was also apparently little progress in London in negotiating and then initialing a broader re-export amendment to the Kazak agreement. There are several hundred metric tons of EUP (enriched before the Soviet Union collapsed in 1991) in Kazakstan in the form of UO2 and possibly UF6.

In comments filed with the Department of Commerce (DOC) before the London meeting (where all parties attended the annual meeting of the Uranium Institute September 9-11), the U.S. miners said that the amendment to allow in the 20 MT "is unsound as a matter of law and policy....It makes a mockery of the department's administrative process."

USEC also objected: "If a foreign customer can obtain low prices for Western-origin EUP at a U.S. fabricator, U.S. customers will expect to be able to obtain EUP at the same artificially low price from other Western suppliers. Obviously, this would be a particular problem for USEC. If the EUP is of U.S. origin (which could happen if the Kazak material were swapped for EUP enriched by USEC), USEC would be under significant pressure to offer the same price to customers—foreign or domestic—who take delivery of EUP at the U.S. fabricator."

USEC went on to make this observation: "The initialed amendment runs counter to the U.S. government's uranium policy as expressed in connection with the USEC privatization. Throughout that process, the U.S. government made it plain that preserving U.S. jobs throughout the uranium industry, avoiding instability in the domestic uranium market, and ensuring the viability of the HEU agreement are vital U.S. policy objectives. Authorization of reexport transactions which create an alternate source of restricted EUP within the territory of the U.S. runs directly counter to those policies."

But GE, under intense competitive pressure, sees a need for the material to allow it to offer better deals to its customers. The Uranium Institute has acknowledged that inventories, like the Kazak inventory, are going to become more important to fabricators in the coming years (see story, page 14).

According to Kazakstan's U.S. attorney, Tom Wilner of Shearman & Sterling, USEC's "unbending" approach is going to lead to Kazakstan's withdrawing from the suspension agreement. USEC, he said, has "destroyed the uranium market" with the announcement of its planned uranium sales, meaning that the price is unlikely, anytime soon, to go over $12 a pound U3O8, the trigger price for the Kazaks to have a so-called Appendix A delivery quota for uranium to the U.S. The Kazaks need "a reasonable and economic deal" that will allow them to make at least as much money as they could make by withdrawing from the agreement, Wilner said. With a Kazak withdrawal, Kazak uranium, like Ukraine uranium, could be enriched in Europe, lose its origin tag, and be brought to the U.S. as some other origin (French or German, for instance) under the theory of substantial transformation.

In The Market . . .

Duke Power is looking for 300,000 lb U3O8 or equivalent UF6 for delivery between December and April 1999. Bids were due last week.

GPU Nuclear is looking for 632,000 lb U3O8 for delivery at the end of October. Bids are due September 28.

Despite the emergence of this new demand, most analysts believe there is sufficient supply to cover it. In fact, competition for this new business is likely to lead to some "dip in the spot price," according to one analyst.

In NuclearFuel's judgment, significant open-market transactions in the U.S. during the forward two-week period could be concluded within the range of $9.80-$10.20/lb U3O8, a slight lowering of the range reported two weeks ago of $9.90-$10.30/lb. So-called unrestricted buyers, those able to use uranium from the Commonwealth of Independent States (CIS), could probably conclude a deal within the range of $8.80-$9.10/lb, the same range reported two weeks ago.

In other market news, Edward Brezinski, most recently

Exhibit DD

Footnote 45 05776

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 14—July 13, 1998

HIGHLIGHTS

Enrichment:

• Urenco aims for Taipower deal for up to 20% of requirements —*page 3*

• Yankee Atomic loss in court might not cripple other D&D litigation —*page 15*

• **SPECIAL REPORT:** USEC Inc. files S-1 registration with SEC —*page 19*

Fuel:

• BNFL head optimistic that Russia will prove as profitable as the U.S. —*page 3*

• BNFL delivering lead assemblies to Finland for use in VVER-440 —*page 5*

Waste Management:

• EPA's proposed disposal standard raises concerns about NRC licensing —*page 5*

• NRC rethinking its position on applying ASME code to fuel canister fabrication —*page 6*

• Point Beach orders Transnuclear casks as backup to Sierra Nuclear —*page 7*

• NCS sues Hesse over cargo halt; NTL might be broken up by Merkel —*page 8*

• France resumes spent fuel shipments with stricter rules —*page 9*

• French committee signals shift in approach to long-term storage —*page 11*

Weapons:

• Fight over tritium production pairs pork and proliferation —*page 13*

USEC STARTLES MINERS, HILL, EVEN DOE BY PLANS TO SELL NATURAL U THROUGH 2005

The U.S. Enrichment Corp. (USEC) may open what is essentially a new mine in the U.S. producing on average about 3.9-million pounds of U3O8 equivalent over the next seven years. How? By underfeeding the gaseous diffusion plants. (U.S. uranium production in 1997 was 5.6-million lb, according to DOE's Energy Information Administration.)

underfeeding

In its S-1 privatization registration statement filed June 29 with the ~~U.S. Securi~~ties & Exchange Commission, USEC says that underfeeding--using less uranium and more SWU to produce ~~a kilogram~~ of enriched uranium than some benchmark tails assay--is economical if the cost of the additional electricity required for SWU production is lower than the savings from the use of less natural uranium and its related disposal costs. Underfeeding serves to stockpile the inventory of natural uranium which, if not needed for production, can be sold, USEC says. USEC attributed part of the 25% decline (from FY-97 to FY-98) in depleted UF6 disposal costs to underfeeding.

According to information provided NuclearFuel, USEC could add in its fiscal 1999 (which began July 1) 1.3-million kgU ~~as UF6~~ to its considerable inventory, which the S-1 says was 12,145 metric tons U as UF6 as of March 1998 (see chart on page 30). On top of that, USEC will receive 16,464 MTU as UF6 from various transfers from DOE. (After all the transfers, USEC will also have an inventory of about 12-million SWU.)

42.5

But a knowledgeable source said that a privatized USEC may elect not to underfeed and instead sell the extra electricity on the open market. "The decision will be a matter of economics," the source said.

USEC's S-1, however, clearly lists the ability to complete uranium sales as a "competitive advantage" for the corporation. "USEC is positioned to supplement its uranium enrichment revenues through new sales of natural uranium," the S-1 says.

A government source said that USEC will behave in a "rationale and economic" manner that maximizes the economic value of the uranium assets.

But the S-1 indicates that USEC will sell all but 5,000 MTU of its inventory through 2005. In the more detailed document that NuclearFuel obtained, USEC indicates that it has already sold from FY-99 to FY-2005 5.4-million kgU as UF6, raising some $184-million in revenue. Surprising some analysts who follow the uranium market is the fact that USEC already has firm sales of 1.2-million kgU as UF6 (about 3.1-million-lb U3O8 equivalent) for FY-2001 at an average price of $33.73 kgU as UF6, the document says.

For the future, USEC indicates that it hopes to sell an additional 2-million kgU as UF6 in FY-99, 4.8-million kgU as UF6 in FY-2000, 5.9-million kgU as UF6 in FY-2001, 8.1-million kgU as UF6 in FY-2002 (over 21-million lb U3O8 equivalent), 5.1-million kgU in FY-2003, 1.9-million kgU as UF6 in FY-2004, and 362,000 kgU as UF6 in FY-2005. USEC, according to the document, indicates that these sales might raise as much as $1.2-billion, but that projection is based on assumed selling prices (in FY-97 dollars) ranging from $35.62/kgU as UF6 in FY-99 to $46.28 kgU as UF6 in FY-2005.

Needless to say, the USEC announcement about its uranium inventories and its selling plans is causing concern in the member companies of the Uranium Producers of America (UPA). Those plans are also worrisome to the Russians who were hoping to sell sizable quantities of uranium coming from the blending-down of their warhead high-enriched uranium (HEU).

Although the Russians are apparently still considering at least two different approaches for selling the uranium, they are said to be leaning to selling most of it to three Western companies--Cameco, Cogema, and Nukem. They are now said to be worried about what kinds of prices the three companies may be willing to offer for the uranium and the impact that lower prices will have on revenue projections that have been included in the Russian government's 1998 budget.

"The Russians are quite alarmed" by the size of USEC's inventory, said one source. "They believe--rightly or wrongly--that they were forced to take back the uranium component and sell it themselves. In return, they were supposed to realize more money." With USEC sales, he said, "the market evaporates" for Russian uranium except at fire sale prices.

A point for airing those concerns seems to be the offices of Sen. Pete Domenici (R-N.M.). In late June, before the S-1 was filed, Domenici wrote to National Security Adviser Sandy Berger saying that USEC's "inventory of natural uranium may be significantly more than I understood to exist when Congress passed the USEC Privatization Act. If there is some 30,000,000 pounds more than contemplated in the legislation, the sale of that material would negatively impact the sale of HEU agreement-derived natural uranium and could significantly reduce the Russian Federation's incentive to continue the agreement."

UPA says it believes that a bargain was struck in the 1996 USEC Privatization Act to limit USEC's uranium sales to no more than 4-million lb U3O8 a year. (The act's limits, however, appear to apply only to the transfer of 7,000 metric tons U as UF6 and 50 MT of high-enriched uranium, containing about 5,000 MTU of natural UF6 equivalent.) UPA said it is also concerned about USEC's high dividend, initially pegged at $1.10 a share. To keep the dividend at that level, USEC is going to be under a lot of pressure to generate cash by selling its inventory, said one UPA source.

But a uranium industry analyst said that except for about 11.6-million lb (the amount USEC is being given by DOE to pay for safety upgrades), the size of the USEC stockpile was well-known for a number years. And said another analyst, "What do the U.S. miners want? New restrictions on U.S. uranium sales?"

And a third analyst said that it should not come as any surprise to the miners that USEC is planning to act as any

(continued on page 17)

CURRENT URANIUM PRICING INDICATORS

(U.S. $/lb U3O8)

Source (date)	Price	Last Report (date)
TradeTech[1] (June 30)		
Exchange value		
Unrestricted	9.20	9.20 (May 31)
Restricted	10.75	10.75
Long-Term U3O8	11.10	11.35
UF6 value ($/kgU as UF6)		
Unrestricted	28.40	28.55
Restricted	32.45	32.60
Nukem[2] (June 30)		
Spot market price range		
Restricted	10.75-11.00	10.75-11.00 (May 31)
Unrestricted	9.20-9.40	9.20-9.40
Conversion-Spot contracts ($/kgU)	4.20-5.15	4.50-5.15
Uranium Exchange[3] (July 6)		
Spot price (restricted)	10.90	10.90 (June 8)
Spot price (CIS)	9.20	9.20

1. TradeTech's Nuexco exchange value reflects the company's judgment of the price at which sales of significant quantities of yellowcake could be concluded as of the reporting date.
—The Restricted Market Values apply to all products and services delivered in the U.S., as well as non-CIS-origin products and services delivered outside the U.S.
—The Unrestricted Market Values apply to CIS-origin products and services delivered outside the U.S.
2. Nukem's restricted price range reflects bids and offers for natural uranium.
—The Restricted Market Range applies to to those transactions in which the buyer/seller is legally restricted by either Euratom Supply Agency or U.S. Department of Commerce from receiving/delivering CIS-origin products and services.
—The Unrestricted Market Range applies to those transactions in which the buyer/seller is not legally restricted by either Euratom Supply Agency or U.S. Department of Commerce from receiving/delivering CIS-origin uranium products and services.
3. The Uranium Exchange's price indicates, subject to the terms listed, the most competitive offer available of which Ux is aware. Those terms (July 6) are: quantity, 200,000-400,000 lb; delivery, within three months; origin/location, open/U.S.; converter; non-CIS/all other locations.

SECONDARY SWU MARKET PRICE ESTIMATE

(in $/SWU)

Source (date)	Price	Last Report (date)
TradeTech (June 30)		
Unrestricted	84	82 (May 31)
Restricted	86	84
Nukem (June 30)	83-86	83-86 (May 31)

U MARKET *(continued from page 2)*
business would in using its assets to make money for its shareholders.

One government source argues that "USEC's interests coincide with the miners' and with the Russians'. Everyone wants prices as high as possible." People should not worry about uneconomic behavior from USEC, the source said. The company "is not a slave to selling any set quantity. It will sell only on a basis that maximizes value."

But there are those who are not comforted by such promises. For them, the question now is what can be done to stop or limit the uranium sales. Hearings in Congress are probable, but legislation is unlikely. Therefore, only the administration can really act now and it shows no signs yet of being willing to call off privatization or to pull back some of the inventory it is giving USEC. (There are those arguing that DOE acted illegally in transferring some of the uranium, raising the possibility of some future lawsuit.)

There were lots of meetings last week involving a number of agencies about what to do about the impact of USEC's uranium sales on the U.S.-Russian HEU agreement. One thought was for the government to accept a lower amount of money so that USEC would not have to borrow $550-million, in return for limiting its uranium sales. That idea has been dismissed, said one government source. "Right now," the source said, 'no one can think of anything to do that USEC, [Department of the] Treasury, and OMB [Office of Management & Budget] don't shoot down."

"I feel we were misled" by USEC, said government sources in at least two Cabinet-level departments. "I feel pretty foolish," added one source. But this source said that so far, no one is willing to push to have the privatization initiative called off. "The president checked the box" approving privatization is the response that worried government officials are getting from higher-ups in a number of agencies.

But some of these officials are now coming up with a worst-case scenario in which USEC resigns as the U.S. executive agent in the HEU deal. These officials believe that if that happens the U.S. will never be able to come up with the money to buy even the SWU component of the blended-down HEU and the whole agreement will come undone. "It's just a terrible mess," said one source said.

In the S-1, USEC says that the prices it is paying under the HEU contract "are substantially higher than the company's marginal cost of producing SWU at the GDPs. Consequently, although the company presently can resell the Russian SWU for more than it is paying for the SWU, such sales are less profitable than sales of SWU produced at the GDPs. The effect of this pricing structure will become more pronounced if market prices for SWU decline further, and there can be no assurance that the price the company pays for the Russian SWU will not exceed the price at which it can resell the material."

USEC indicates that it wants to keep its executive agent role because any new executive agent appointed by the U.S. "could represent a significant new competitor that could adversely affect the company's market share and profitability."

So far, Vice President Al Gore has not expressed any concerns about the privatization, despite a stinging press release from the Oil, Chemical, & Atomic Workers union that accused Gore of sacrificing the HEU agreement, hurting taxpayers, and impoverishing the communities of Portsmouth, Ohio and Paducah, Ky. (where the GDPs are located), "while enriching a group of Wall Street investors."

OCAW President Robert Wages said that "Mr. Gore's infatuation with his 'reinventing government' initiative has apparently defeated the common-sense proposition that national security should not be entrusted to an entity whose interests are adverse to national, if not global, security." Gore's press secretary did not return a phone call by NuclearFuel's deadline.

Gore is to meet with new Russian Prime Minister Sergei Kirienko in Moscow for several days beginning July 24 as part of the 11th meeting of the U.S.-Russian Commission on Economic & Technical Cooperation.

USEC's Vice President for Corporate Communications Charles Yulish said the union's press release "was worthy of the PR Hall of Fame" because of the number of pithy "sound bites" it contained.

In The Market . . .

Duke Power is looking for about 250,000 lb U3O8 equivalent as either yellowcake or UF6 for delivery later this year at USEC. In addition, the utility is looking for about 40,000 SWU for delivery in late 1999 or early 2000. Bids were due July 8.

Pacific Gas & Electric is out looking for 12,000 SWU. Bids are due July 14.

Texas Utilities is looking for 112,000 kgU of conversion services and about 5,000 SWU contained in enriched uranium product. Bids are due July 13.

Northern States Power is said to be seeking about 30,000 SWU. Bids are July 15.

Meanwhile, Centerior is said to be reviewing a number of off-market offers for uranium and possibly SWU.

In NuclearFuel's judgment, significant open-market transactions in the U.S. during the forward two-week period could be concluded within the range of $10.30-$10.70/lb U3O8, a decrease and tightening of the range reported two weeks ago of $10.40-$10.80/lb. So-called unrestricted buyers, those able to use uranium from the Commonwealth of Independent States (CIS), could probably conclude a deal within the range of $9.00-$9.20/lb, a decrease in the range reported two weeks ago of $9.10-$9.40.

Heathgate Inks Deal With U.S. Utility

Australia's Heathgate Resources, an affiliate of the U.S.'s General Atomics, has apparently signed a long-term uranium contract for 300,000 lb/yr for five years. The deal is rumored to be with Pennsylvania Power & Light at a price slightly above $11/lb U3O8. Heathgate is developing the Beverley in situ leaching uranium project in South Australia. Heathgate has been operating a pilot plant and has filed its environmental impact statement with the government. It hopes for the necessary approvals and export license by the end of 1998, so that it can begin construction of its ISL plant in 1999. It hopes to ramp up from initial production of 1-million lb U_3O_8 in the first year to about 2-million lb/yr. Reserves are estimated at about 21,000 metric tons U, but might be as much as 30,000 MTU. Production costs are said to be below $10/ lb U_3O_8.

Heathgate is said to have a number of contract discussion proposals before one European utility and three U.S. utilities.

APS Supports Import of Kazak EUP

Arizona Public Service (APS) said that it has contracted to buy uranium from Kazakstan for use at Palo Verde. The contract, however, is apparently contingent on the Department of Commerce allowing Nukem to import for processing and deconversion at General Electric UO_2 that was enriched before the breakup of the Soviet Union and stored since then in Kazakstan.

In comments filed with DOC last month, APS urged DOC to treat the uranium as coming solely under the Kazak suspension agreement and legal for import under the Appendix A provisions of that agreement (assuming price and quantity requirements of Appendix A are satisfied).

—Michael Knapik, Washington

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Exhibit EE

Footnote 48

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 21—October 19, 1998

HIGHLIGHTS

Enrichment:
• USEC beats Russian amendment deadline, files two matched SWU contracts —*page 2*

• Canadian nonproliferation rules hold up Tenex tails enrichment —*page 3*

Fuel:
• Korea said unlikely to accept Cogema bid to acquire KNFC —*page 5*

Fuel Cycle:
• No spent fuel reprocessing, new Kepco CEO Chang declares —*page 5*

Nonproliferation:
• Siemens fights MOX bid rejection; GA gets federal funds for gas reactor —*page 13*

BUDGET DEAL INCLUDES $200 MILLION FOR RUSSIAN MOX EFFORT —*page 18*

Uranium:
• Despite wildcards, U.S. Energy still betting on Jackpot mine —*page 10*

• Uranium producers hunker down as hard times continue —*page 11*

Waste Management:
• GNB might seek utilities' help in speeding up cask licensing —*page 6*

• NRC unveils draft risk-informed rule for HLW repository at Yucca Mountain —*page 7*

• NRC will chip in funds for BEIR VII so agency's concerns will be addressed —*page 8*

Weapons:
• New Russian dual-purpose cask might be ready to aid naval cleanup in 2000 —*page 6*

USEC REPORTS HIGHER COSTS, SAYS EARNINGS IN FY-99 WON'T MEET ANALYSTS EXPECTATIONS

USEC Inc. said that its fiscal 1999 costs will be higher than it expected, while its FY-99 earnings will be lower than analysts expected. In a report of its first-quarter earnings, USEC said that its gross profit for the first thee months of FY-99 (which began July 1) was $59.3 million on sales of $307.9 million. This compares to a gross profit of $98.3 million on sales of $440.4 million for the first three months of FY-98.

A special income tax benefit of $54.5 million for deferred income tax benefits that arose from the company's transition to taxable status boosted net income for the quarter to $63.1 million, or 63 cents per share. Without this benefit, USEC's net income would have been $8.6 million, or 9 cents per share. The federal corporation was privatized July 28.

USEC President and CEO William Timbers said first-quarter results "are on target and revenue for the fiscal year is anticipated to be in line with analysts expectations."

But USEC, according to sources, just lost a fierce competi-

(continued on page 15)

MINNESOTA DPS RECOMMENDS STATE WITHHOLD ALL OF FEE AFTER DOE REJECTS ESCROW

When Energy Secretary Bill Richardson last week rejected state regulators' demand that over three-fourths of the future waste fund money collected from ratepayers be held in escrow until DOE begins taking commercial spent fuel, the Minnesota Department of Public Service (DPS) shot back that it was upping the ante and was now recommending that Minnesota regulators escrow all of it.

If the Minnesota Public Utilities Commission (PUC) agrees, the move would make Minnesota the first state to withhold ratepayer money from the Nuclear Waste Fund. Congress established the fund in 1982 to bankroll DOE's civilian nuclear waste program.

Since then the fund has amassed more than $14 billion in waste fees and interest, with customers of nuclear utilities nationwide collectively paying roughly $600 million a year into it. Annual payments by customers of Northern States Power Co. (NSP), the only nuclear utility in Minnesota, total $16 million.

could be transformed by enrichment in Europe or elsewhere), Russia was given two more years to negotiate additional matched SWU sales with USEC. The total quantity of Russian SWU was capped at 1.6 million SWU. This was the unused quantity of 2 million matchable SWU available under a 1994 amendment to the Russian suspension agreement.

The two matched sales contracts with U.S. utilities used up less than half the available quota, according to sources. One contract covers deliveries in 1999 and 2000, while the other is for deliveries in 2000 and 2001. The imported feed associated with the SWU will be placed in a feed escrow account. The uranium can be withdrawn to be exported from the U.S. or used in another matched import contract.

The USEC filings may help diffuse, at least temporarily, the Russians' growing frustration with the suspension agreement. Russian officials believe they have very competitive enrichment technology and should be allowed to have a greater presence in both the U.S. and European markets. (In the U.S., the Russians have a number of grandfathered SWU contracts, in addition to the SWU they have been delivering under the U.S.-Russia high-enriched uranium agreement. Next year, they will be delivering 5.5 million SWU under that agreement. However, the Russians have so far not been able to convince DOC to allow a replacement for the grandfathered Maine Yankee SWU contract, which was terminated when the plant was permanently closed.)

According to sources, there are no scheduled talks with DOC on replacing the now-expired 1996 amendment to the Russian suspension agreement.

At the Nuclear Energy Institute's (NEI) recent uranium fuel seminar in Tucson, Ariz., Alexander Chernov, president of Global Nuclear Services & Supply Ltd., said that Russia's four enrichment plants use fifth-, sixth- and seventh-generation centrifuges, with the latest, the seventh generation, being installed in 1997 in the Ural Electrochemical Integrated Plant (UEIP). He said the "modernized blocks" have twice the separative capacity with no appreciable change to costs. He said the new centrifuges have "proven the forecasts made by researchers and completely met our economical and technical expectations." He said the capacity of the Russian plants totals 20 million SWU per year. Not all of that is being used, however.

In three different places in his prepared remarks, Chernov, who authored the paper with representatives from the Russian Ministry of Atomic Energy and UEIP, mentioned the current U.S. and European Union restrictions on sales of Russian SWU. The "main problem presently faced by the Russian enrichment industry consists of the restrictions imposed on U.S. market sales in accordance with the antidumping investigation against uranium from the Russian Federation," he said. "We expect these unfair restrictions on Russian SWU to be lifted soon, which will significantly increase the competitiveness of the U.S. nuclear energy industry."

With the low cost of production from the centrifuge plants, Chernvov said in another place in his prepared remarks, "it appears that it is time to acknowledge these incontrovertible facts and remove the restrictions officially imposed on the imports of Russian SWU into the U.S. and unofficially on the imports into the European Community countries."

In its S-1 filing in July with the U.S. Securities & Exchange Commission, USEC said the following about its Russian enrichment competitor, Techsnabexport (Tenex): "Although Tenex's centrifuge plants are older and therefore less efficient than those of Urenco, USEC believes that Tenex has the lowest overall production costs of the major suppliers. Tenex benefits from (i) low-power requirements (a characteristic of centrifuge technology), (ii) moderate manpower costs (a result of its low wage rate, notwithstanding its high labor and overhead levels) and (iii) minimal capital charges. Despite Tenex's favorable cost structure, it operates at less than maximum capacity because trade and political restrictions limit its ability to access the United States, Western European and certain Asian markets. In addition, the Company believes that Tenex's production capacity is further constrained by its current equipment conditions."

In his prepared remarks, Chernov said that the economics of enrichment in Russia allow for a significant improvement in the extraction of U-235 from tails. He said the improvements reduce the need for the natural uranium by about 30%, thus making it possible to begin processing the enrichment tails that until now have been left unprocessed.

George White, now a consultant affiliated with the Uranium Exchange Co., said in his paper at the NEI uranium conference that Russia is believed to have reduced its operating tails to 0.12%.

He said the Russians have an estimated 9 million SWU/year that are excess to their needs. If the Russians use the 9 million SWU to strip tails from 0.20% to 0.12%, the SWU would generate less than 12 million lb U3O8 equivalent per year. However, if the Russian enrichment plants gain access to larger amounts of 0.30% tails from Western enrichers and only strip them to 0.20%, they would produce 29 million lb U3O8 per year.

White said that it is likely that the Russians have contracted with Urenco to strip tails as far as 0.25% (from 0.30%). They are then probably stripping them further—to 0.12%—to produce uranium for their own account, White suggested.—*Michael Knapik, Tucson and Washington*

CANADIAN NONPROLIFERATION RULES HOLD UP TENEX TAILS ENRICHMENT

Senior officials from the European Commission (EC) at the 1998 IAEA General Conference in Vienna in late September held side meetings with Canadian, German, and Russian delegations to discuss certain aspects of Urenco's ongoing program to transfer enrichment tails to Russia for re-enrichment in Russian gas centrifuge plants, sources said.

Exhibit FF

NUREG-1508
BLM NM-010-93-02
BIA EIS-92-001

Final
Environmental Impact Statement
to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico

Docket No. 40-8968
Hydro Resources, Inc.

Manuscript Completed: February 1997
Date Published: February 1997

Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

in Cooperation With

Albuquerque District
U.S. Bureau of Land Management
Albuquerque, New Mexico 87107

Navajo Area Office
U.S. Bureau of Indian Affairs
Gallup, New Mexico 83701

5.1.1 Potential Production

Both the employment generated and the taxes paid by HRI would depend on the production of yellowcake. The amount of yellowcake produced would depend on the market price and the cost of production. Table 5.1 shows HRI's projected costs of producing yellowcake for the alternative operations. Table 5.2 provides the current price of U_3O_8 and the latest government projection of price through 2010. It should be noted that the spot-market price in October 1996 was $3 higher than the projected price for the same year. Over the last 10 years, the spot-market price has been very volatile, fluctuating from a high of over $16 in 1987 to a low of less than $8 in 1991. As late as 1995, the price was less than $10 per pound.

Table 5.1. Average production costs per pound of yellowcake under alternative project designs

Alternative configurations	Church Rock	Unit 1	Crownpoint
Haul loaded resin to other site for processing and drying	$11.36	$10.46	$9.46
Ship yellowcake slurry to dryer at other site for drying	$11.32	$10.48	$9.40
Ship yellowcake slurry to Texas for drying	$11.83	$11.05	$9.87
Stand-alone—all processing done at each site	$11.30	$10.51	$9.38

Source: HRI, *Response to Request for Additional Information, Issue 92: Cost/Benefit Analysis*

Table 5.2. Projected price of U_3O_8

Year	Latest DOE/EIA spot market projection (adjusted to 1996$)
Current price on spot market (10/21/96)	$15.70
1996	$12.72
1997	$12.74
1998	$12.62
1999	$13.00
2000	$13.31
2005	$14.86
2010	$17.38

Source: Uranium Industry Annual 1995 [DOE/EIA-0478(95)]. Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels, U.S. Department of Energy, May 1996.