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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	ASLBP No. 97-732-02-ISFSI

APPLICANT'S MOTION FOR SUMMARY DISPOSITION OF OGD CONTENTION O – ENVIRONMENTAL JUSTICE

Applicant Private Fuel Storage, L.L.C. ("Applicant" or "PFS") moves for summary disposition of Ohngo Gaudadeh Devia ("OGD") Contention O—Environmental Justice ("OGD O") pursuant to 10 C.F.R. § 2.749. Summary disposition is warranted on the grounds that there exists no genuine issue as to any material fact relevant to the contention and PFS is entitled to a decision as a matter of law. This motion is supported by a statement of material facts and the declarations of Roger Bezdek, George Carruth, and George Liang.

I. STATEMENT OF THE ISSUE

Contention OGD O, as admitted, asserts that:

> The license application poses undue risk to public health and safety because it fails to address environmental justice issues. . . . . Presently, the area is surrounded by a ring of environmentally harmful companies and facilities. Within a radius of thirty-five (35) miles the members of OGD and the Goshute reservation are inundated with hazardous waste from: Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill.

Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 233, recons. granted in part and denied in part, LBP-98-10, 47 NRC 288, 298-99

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(1998). In admitting the contention, the Board limited its scope "to the disparate impact matters outlined in bases one, five, and six."[1] Bases one, five, and six of OGD O assert:[2]

1. The proposed plant will have negative economic and sociological impacts on the native community of Goshute Indians who live near the site. The application demonstrates no attempts to avoid or mitigate the disparate impact of the proposed plant on this minority community.

5. The Environmental Report ("ER") fails to consider disproportionate cumulative impacts[3] from Dugway Proving Ground ("Dugway"), Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste storage facility ("Envirocare"), APTUS Hazardous Waste Incinerator ("Aptus"), and Grassy Mountain Hazardous Waste Landfill ("Grassy Mountain") that may be suffered by members of the Skull Valley Goshutes.[4]

6. The ER fails to address the effect that the PFSF will have on property values in and around the Skull Valley Goshute community as part of its environmental justice assessment.

II. LEGAL BASIS

A. Summary Disposition

The legal standards relevant to summary disposition have been set forth previously.[5] OGD may file affidavits purporting to contain expert opinions in opposition to this motion and therefore the legal requirements concerning such, id. at 10-15, will be

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[1] LBP-98-7, 47 NRC at 233; see Memorandum and Order (Denying Motion to Compel) (Dec. 3, 1999) at 2.

[2] LBP-98-7, 47 NRC at 233; see Applicant's Answer to Petitioners' Contentions (Dec. 24, 1997) at 591-93 (summarizing bases of OGD O); Ohngo Gaudadeh Devia's Contentions Regarding the Materials License Application of Private Fuel Storage in an Independent Spent Fuel Storage Installation (Nov. 24, 1997) ("Contentions").

[3] Basis 5 does not mention accidents at all. See Contentions at 27-28, 32-34. Thus, its scope should be limited to consideration of the effects of normal operations of the PFSF and the enumerated facilities. If, nonetheless, Basis 5 is read to include potential accidents, PFS's analysis below shows that they will have no significant cumulative impact on the Skull Valley Band.

[4] The Board specifically limited the scope of Basis 5 OGD O to consideration of impacts from the enumerated facilities. See LBP-98-10, 47 NRC at 298-99, 301. The Clive hazardous waste storage facility was not included in the contention but it was mentioned in Basis 5. Contentions at 32. Even if that facility is included within OGD O, it will create no cumulative impacts, in that it is no longer operational. Declaration of George Carruth (May 24, 2001) ¶ 20.

[5] See, e.g., Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation), LBP-99-23, 49 NRC 485, 491 (1999); Applicant's Motion For Summary Disposition of Utah Contention C – Failure to Demonstrate Compliance With NRC Dose Limits, (April 21, 1999), at 4-16.

particularly relevant here.[6] These requirements include 1) demonstration that the affiant is an expert, and 2) an explanation of facts and reasons in the affidavit supporting the affiant's expert's opinion.[7] An affidavit made on "information and belief" is insufficient,[8] as are mere unsupported conclusions.[9] As the Supreme Court has held, reliable expert opinion must be based on "more than subjective belief or unsupported speculation."[10]

B. Environmental Justice

Contention OGD O is assertedly based on Executive Order 12898, which directs that each Federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low income populations in the United States."[11] The Commission has stated in this case, however, that the executive order "created no new legal rights or remedies; accordingly, it imposed no legal requirements upon the Commission." Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), CLI-98-13, 48 NRC 26, 35-36 (1998) (emphasis added).[12] The purpose of the executive order was only to underscore applicable provisions of existing law, here, the National Environmental Policy Act ("NEPA"). Id. at 36. Thus, the NRC's goal with respect to the environmental justice

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[6] OGD may also file affidavits of lay witnesses. Such affidavits must be based on the personal knowledge of the witness. Fed. R. Evid. 602.

[7] See Mid-State Fertilizer Co. v. Exchange Nat'l Bank, 877 F.2d 1333, 1339 (7th Cir. 1989); Carolina Power & Light Co. (Shearon Harris Nuclear Plant, Units 1 and 2), LBP-84-7, 19 NRC 432, 447 (1984).

[8] Columbia Pictures Industries, Inc. v. Professional Real Estate Investors, Inc., 944 F.2d 1525, 1529 (9th Cir. 1991), aff'd on other grounds, 508 U.S. 49 (1993).

[9] Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), LBP-83-32A, 17 NRC 1170, 1177 (1983); Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-99-35, 50 NRC 180, 194 (1999).

[10] Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 590 (1993). As discussed further in Section III.A.3, infra, alleged facts must also be within the scope of the contention.

[11] Ex. Order No. 12898, 59 Fed. Reg. 7,629 (1994), quoted in LBP-98-7, 47 NRC at 233 (emphasis added).

[12] See also Sur Contra La Contaminacion v. EPA, 202 F.3d 443, 449 (1st Cir. 2000); Air Transport Ass'n v. FAA, 169 F.3d 1, 8-9 (D.C. Cir. 1999); Morongo Band of Mission Indians v. FAA, 161 F.3d 569, 575 (9th Cir. 1998) (order creates no enforceable rights).

"disparate impact" analysis is to assess adverse effects "on low-income and minority communities that become apparent only by considering factors peculiar to those communities." Id. Those are "interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action." Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 64 (2001) (emphasis added). Broader questions of "motivation and social equity in [facility] siting," however, remain "outside NEPA's purview" and hence outside the scope of this proceeding. CLI-98-13, 48 NRC at 36 (citing Louisiana Enrichment Services, L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 101-06 (1998)). Thus, the only impacts cognizable within the scope of OGD O are those that are also ordinarily cognizable in NRC proceedings under NEPA.[13]

C. Environmental Impact Statement

NEPA and the NRC regulations promulgated thereunder require that an Environmental Impact Statement (EIS) describe the potential impacts of a proposed action on the environment. 10 C.F.R. § 51.45(a)(1). The discussion of environmental impacts should be sufficient "to enable the decisionmaker to take a 'hard look' at environmental factors and make a reasoned decision." Claiborne, CLI-98-3, 47 NRC at 88. An EIS is prepared under a " rule of reason" standard. Id. at 97. Thus, "impacts shall be discussed in proportion to their significance." 10 C.F.R. § 51.45(a)(1). Therefore, insignificant impacts need receive little or no treatment in the DEIS. See 10 C.F.R. 51.29(a)(3) (discussion of peripheral or insignificant issues limited to brief presentation of why they are peripheral or will not have a significant effect on the quality of the human environment). The evaluation of the discussion of impacts related to environmental justice is based on the whole DEIS, not any particular section that may be labeled "environmental justice". See

[13] The scope of OGD O is also limited by the literal terms of the contention and its bases. Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-899, 28 NRC 93, 97 & n.11 (1988).

Hydro Resources, CLI-01-4, 53 NRC at 64-65. Finally, the environmental record in this proceeding includes material filed with this motion as well as the DEIS. See Allied-General Nuclear Services (Barnwell Nuclear Fuel Plant Separations Facility), ALAB-296, 2 NRC 671, 680 (1975).

III. PFS IS ENTITLED TO SUMMARY DISPOSITION OF OGD O

PFS is entitled to summary disposition of OGD O because there remains no genuine issue as to any material fact relevant to the contention and PFS is entitled to a decision as a matter of law. PFS addresses each admitted basis of OGD O in turn below.

A. Economic and Sociological Impacts

Basis 1 of OGD O asserts that the discussion in the ER is inadequate with respect to "negative economic and sociological impacts" on the Goshutes. Contentions at 28. The ER assertedly "does not reflect consideration of the fact that the plant is to be placed in the dead center of an Indian Reservation." Id. The license application allegedly "does not demonstrate any attempts to avoid or mitigate the disparate impact of the proposed plant on this minority community." Id. at 29. OGD Basis 1, however, did not identify any specific disproportionate economic or sociological impacts that were inadequately discussed. Id. at 28-29. Rather, it focussed on the alleged racial motivation for the siting of the PFSF, which issue the Commission clearly stated was "outside NEPA's purview." CLI-98-13, 48 NRC at 36.

Contrary to OGD's claim, the DEIS[14] explicitly discusses environmental justice and the Skull Valley Band and "conclude[s] that no disproportionately high and adverse impacts will occur to the Skull Valley Band . . . ." DEIS § 6.2.1.2 (emphasis added); see id. §§ 6.4.9. 6.7.9. In fact, OGD has not alleged any specific environmental impacts not

[14] As PFS has previously shown, once the DEIS is published it supersedes the ER, and environmental contentions should thenceforth be treated as challenges to the DEIS. See Applicant's Motion for Summary Disposition of Utah Contention Z—No Action Alternative (Feb. 14, 2001) at 3, 6-7.

discussed in the DEIS.[15] To the extent OGD has asserted in discovery impacts not covered in the DEIS, as discussed in Section III.A.3, infra, those impacts arise from fear and other intangible, psychological effects, which the DEIS need not discuss, as those impacts lie outside the scope of OGD O and NEPA.

1. Sociological Impacts

Contrary to OGD O, the DEIS plainly addresses the sociological impacts of the construction and operation of the PFSF on the Band and, where they are more than "small," the impacts' mitigation:[16]

- It clearly reflects the fact that the PFSF will be located on the Skull Valley Reservation and recognizes that the Skull Valley Band is a minority and low-income community. DEIS §§ 2.1.1.1, 6.2.1.1 and Fig. 2.1.
- It discusses the traffic that will occur on Skull Valley Road because of the construction and operation of the facility and the potential for mitigating its effects through scheduling. Id. §§ 4.5.1.6, 4.5.2.6, 4.5.4.
- It discusses potential negative environmental impacts on Band members from increased noise and limited disruption of the visual qualities resource. Id. §§ 4.8, 6.2.1.2. It discusses potential measures to mitigate the visual impact of the facility, such as the selection of paint colors to blend in with the surroundings and light shielding to minimize diffusion. Id. § 4.8.2.8.
- It discusses the numerous surveys for cultural, archaeological and historic resources conducted in the project area, including those specific for Native American resources. Id. § 3.6.2 et. seq. It states that "no traditional cultural properties or usage of culturally important resources have been documented." Id. § 3.6.2.2 (emphasis added). The impact on cultural resources, if any, will be minimal. Id. §§ 4.6.1, 4.6.2. Moreover, if any buried cultural resources are discovered at the site, specific mitigation measures will be taken to minimize impact upon them. Id. § 4.6.5.
- Specifically regarding Native American cultural resources, it recognizes that "[g]eneral issues related to broader cultural values held by some Skull Valley Band members living on the Reservation in proximity to the proposed PFSF have been raised" and that impacts on natural resources, reverence for the larger area

[15] See Second Additional Response to Private Fuel Storage's (PFS) (Renewed) Motion to Compel (May 4, 2001) at 4 ("OGD 2nd Add. Resp."); Applicant's Motion to Compel Answers to Applicant's Discovery Requests to Intervenor OGD (March 28, 2001) at 6-8.

[16] Impacts on the Skull Valley Band discussed below are also summarized in section 6.2.1.2 of the DEIS.

and sacred religious ceremonies have been alleged. Id. § 4.6.3; see also id. at 6-31. It states, however, that "according to the Skull Valley Band Tribal Chairman, no traditional cultural properties or use of culturally important natural resources are known within the specific project areas . . . . Traditional plants of value to the Skull Valley Band . . . are sparse in the PFS project area . . . and are considered inferior to the same plants growing in the nearby mountains east of the Reservation and the adjacent Tooele Valley." Id. at 4-38. "Consequently, construction and operation of the [PFSF] is considered to have a small potential for affecting Tribal cultural values or traditional cultural properties. Based on the known situation, no mitigation measures are required for potential impacts to Native American resources." Id. (emphasis added).

- It discusses the potential influx of new residents during the construction and operation of the facility and the effects the influx would have on the population near the site, housing resources, education resources, and utilities. Id. §§ 4.5.1.1 to 4.5.1.4, 4.5.2.1 to 4.5.2.4.
- It discusses the sociological impacts on the Band from the shift in usage of a relatively small parcel of Reservation land from agricultural to industrial usage and notes that access restrictions would possibly preempt some traditional land uses contrary to the desires of some Band members. Id. at 6-31.
- It shows that the PFS project would have a negligible impact on groundwater resources used by Band members. Id. §§ 4.2.1.2, 4.2.2.3; see id. at 6-27.

Therefore, because the DEIS has adequately discussed the sociological impacts of the PFS project on the Skull Valley Band, PFS is entitled to summary disposition of this portion of Contention OGD O.[17]

2. Economic Impacts

Contrary to OGD O, the DEIS also addresses economic impacts on the Band. DEIS at 4-27. It clearly shows that the economic impact of the PFSF on the Band is positive, in large part because of PFS lease payments to the Band. Id. § 4.5.2.8; id. at 6-31. The creation of jobs (the lease with PFS requires a preference for hiring Band members) and project-related expenditures in the area will also have positive economic im-

[17] As discussed above, OGD in Basis 1 of the contention focussed on the alleged racial motivation for the siting of the PFSF, clearly outside of NEPA's purview, and did not identify a single, specific disproportionate economic or sociological impacts that it claimed had been inadequately discussed. Contentions at 28-29. Further while OGD has in discovery asserted various impacts outside the scope of NEPA, OGD has not identified any specific disparate environmental impact that the DEIS failed to discuss, nor any specific inadequacy in those impacts discussed by the DEIS. See note 15 supra.

pacts on the Band. Id. §§ 4.5.1.8, 4.5.2.8, 6.2.1.2.

Furthermore, the attached declaration and report of Dr. Bezdek shows net positive economic impacts on rural counties after the construction of nuclear facilities, including improved education and other government services and the creation of jobs. Declaration of Roger Bezdek ¶¶ 4-5 (May 22, 2001). The Reservation and Tooele County possess characteristics similar to those counties, such as population density, relative income, and the receipt of substantial revenues from the facilities in question.[18] Id. ¶¶ 7-8. Dr. Bezdek's declaration supports the DEIS conclusion that the economic impact of the PFSF on the Band will be positive, even independent of the PFS lease payments to the Band.

Environmental justice concerns "disproportionately high and adverse impacts." Executive Order 12898 (emphasis added); see Claiborne, CLI-98-3, 47 NRC at 106. Therefore, the positive economic impact on the Band from the proposed action is simply not an environmental justice concern. The OGD assertion that the PFSF would have a negative economic affect on the local community is merely subjective belief and unsupported speculation, which is no bar to summary disposition. Advanced Medical Systems, Inc. (One Factory Row, Geneva, Ohio 44021) CLI-93-22, 38 NRC 98, 102 (1993). Therefore, PFS is entitled to summary disposition of this portion of Contention OGD O.

3. Intangible Impacts Are Outside the Scope of the Contention

In response to PFS discovery requests, OGD has alleged various intangible effects of the PFS project on the Band that, if raised here, the Board should reject as providing no grounds for denying this motion. OGD has asserted that the construction, operation, and decommissioning of the PFSF would be "antithetical to [the Goshute] way of life" and would alienate the Goshutes from their surroundings or affect their connection with

[18] While the other facilities paid property taxes, PFS will make substantial direct payments to Tooele County in lieu of taxes. DEIS at 4-36.

ancestral lands.[19] Exposure to "the intrusion of high-tech culture" would have adverse impacts on the "mental and spiritual well-being" of Band members and the intrusion of the PFSF would "disrupt the sense of community" among them. Id. at 4. The facility would cause impacts from "stigmatization . . . from adverse impacts (real or perceived)." Id. at 5. Finally, OGD has also claimed that the PFS project has had harmful impacts on the intra-Band political process.[20]

If OGD raises these sorts of impacts, its argument should be rejected for three reasons. First, these psychological impacts are outside the terms of OGD O Basis 1. OGD raised them in Contention OGD P, which the Board rejected. LBP-98-7, 47 NRC at 233-34. The litigable scope of a contention is limited to the literal terms of the contention and its bases, as admitted by the Board. Seabrook, supra note 9, ALAB-899, 28 NRC at 97 & n.11; Vermont Yankee Nuclear Power Corp (Vermont Yankee Nuclear Power Station), ALAB-876, 26 NRC 277, 284 (1987). Also, impacts not arising from the "proposed action" (e.g., those alleged to arise from the licensing process) are outside the scope of NEPA and need not be discussed. See 10 C.F.R. § 51.45(b).

Second, these sorts of abstract, intangible effects are not cognizable under NEPA and hence the fact that the DEIS does not discuss them (assuming arguendo their existence) is not a deficiency. The Board has held that "psychological stress" is not cognizable as an environmental impact under NEPA. LBP-98-7, 47 NRC at 233, 234 (citing Metropolitan Edison Co. v. People Against Nuclear Energy, 460 U.S. 766, 772-79 (1983)). In Metropolitan Edison, the Supreme Court held that "NEPA does not require the agency to assess every impact or effect of its proposed action, but only the impact or

[19] Ohngo Gaudadeh Devia's (OGD's) Responses to Applicant's First Set of Discovery Requests (May 28, 1999) ("OGD 1st Resp.") at 3-4; see Ohngo Gaudadeh Devia's (OGD) Second Response to Applicant's First Set of Discovery Requests (July 7, 1999) at 2 ("OGD 2nd Resp.") (asserting impacts from "symbolism," etc.).

[20] OGD 2nd Add. Resp., supra note 15, at 4; see also OGD Response to PFS Motion for Entry of Order to Compel (May 14, 2001) ("OGD 3rd Resp.") at 3-4.

effect on the environment." 460 U.S. at 772 (emphasis in original). "[A]lthough NEPA states its goals in sweeping terms of human health and welfare, these goals are ends that Congress has chosen to pursue by means of protecting the physical environment." Id. at 773 (emphasis in original, footnote omitted). Thus, to be cognizable under NEPA, there must be "a reasonably close causal relationship between a change in the physical environment and the effect at issue." Id. at 774. The causal chain from 1) the renewed operation of the Metropolitan Edison reactor, to 2) risk, to 3) perception of the risk, to 4) psychological stress extended beyond NEPA's reach. Id. at 775.

The Court similarly rejected as beyond the reach of NEPA the plaintiff's contention of psychological impacts assertedly arising from the action, which the plaintiff had expressed in terms of "impaired . . . sense of well being," "anxiety," "tension," "fear," "a sense of helplessness," "harm to the stability, cohesiveness, and well being of the communit[y]," and stigma ("[t]he perception . . . that the communit[y] . . . [is an] undesirable location[] for business and industry . . . or homes."). Id. at 769 n.2. The Court reasoned that such asserted impacts are "more closely connected with the broader political process" than the physical environment and thus are not cognizable under NEPA.[21]

Such psychological impacts are not cognizable for two reasons. First, if they were

> agencies would . . . be obliged to expend considerable resources developing psychiatric expertise that is not otherwise relevant to their congressionally assigned functions. The available resources may be spread so thin that agencies are unable adequately to pursue protection of the physical environment and natural resources.

Metropolitan Edison, 460 U.S. at 776. Second, asserted psychological impacts resulting from actual risk are indistinguishable from irrational fear of the effects of a decision or

[21] Id. at 777 n.12 (citing id. at 769 n.2); see id. at 779 n.14; see also Maryland-National Capital Park and Planning Comm'n v. United States Postal Service, 487 F.2d 1029, 1038-39 (D.C. Cir. 1973) (intangible psychological effects and issues of individual preference fall outside the scope of NEPA).

mere dislike of a decision on policy grounds. Id. at 777-78. NEPA was not "intended to give citizens a general opportunity to air their policy objections to proposed federal actions. The political process, and not NEPA, provides the appropriate forum in which to air policy disagreements." Id. at 777. Moreover, couching policy disagreement in terms of psychological impact does not bring the impact within the ambit of NEPA. Id. at 777-78. "It would be extraordinarily difficult for agencies to differentiate between 'genuine' claims of psychological health damage and claims that are grounded solely in disagreement with a democratically adopted policy" and NEPA does not require them to do so. Id. at 778. Therefore, the intangible effects that OGD asserts would arise from the PFS project are outside the scope of NEPA and thus need not be addressed in the DEIS.[22]

Third, OGD may assert, as it has in discovery, that the DEIS is deficient for failing to discuss asserted disputes within the Skull Valley Band regarding the PFS project and the potential use or distribution of money received by the Band from PFS[23] and for failing to discuss impacts on the intra-Band political process.[24] Those issues should be

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[22] To the extent that OGD asserts that the PFS project would be offensive or objectionable to the Goshute religion, making such a determination would require the NRC to resolve a controversy over Goshute religious doctrine, which is prohibited by the First Amendment. See Presbyterian Church v. Hull Church, 393 U.S. 440, 449-50 (1969); Serbian Eastern Orthodox Diocese v. Milivojevich, 426 U.S. 696, 708-10 (1976). Thus, the offensiveness or non-offensiveness of the project to the Goshute religion falls outside the scope of NEPA for this reason as well as being an abstract, intangible effect.

[23] See, e.g., Ohngo Gaudadeh Devia's (OGD) Supplemental Responses to Applicant's First Set of Discovery Requests and Initial Responses to Applicant's Second Set of Discovery Requests (Mar. 8, 2001) at 4 ("OGD Supp. Resp.") (asserting that "individual members of the Band . . . will be denied economic . . . benefits . . . as a result of their real and/or perceived opposition to the PFS facility").

[24] See, e.g., OGD 2nd Add. Resp., supra note 15, at 4 (alleging that "PFS's bypassing the Tribes legitimate government . . . [led] to corruption and disparate adverse impacts"). In a similar vein, OGD may also claim that the Band's lease with PFS is invalid. See, e.g., OGD 3rd Resp. supra note 20, at 3-4. The Board should reject that claim because the issue of the lease's validity is 1) outside the scope of both OGD O and NEPA for the reasons set forth in the text, and 2) outside the NRC's jurisdiction. The lease has properly been subject to the internal political process of the Band, a sovereign Indian Tribe (see note 25, infra), and moreover has been approved by the responsible federal agency, the Bureau of Indian Affairs, subject only to completion of the environmental review process. Thus, whether OGD's claim concerning the lease and its related claims (such as whether Chairman Bear is in fact chair of the Band) might be raised in another forum, they clearly have no place here. In this respect, OGD members have sought to raise these claims both administratively to the BIA and in the federal courts. See Exhibit 2 to Applicant's Motion for Protective Order Restricting Scope of Deposition OGD O Contention O – Environmental Justice (May 17, 2001). ("PFS Mot.")

rejected as outside the scope of OGD O for two reasons. First, as discussed above, political disputes and impacts on the political process are not environmental impacts within the ambit of NEPA and thus need not be discussed in the DEIS.[25] Second, environmental justice, and thus OGD O, concerns adverse impacts on "low-income and minority communities." CLI-98-13, 48 NRC at 36 (emphasis added). It is not controverted that PFS will make payments to the Band (i.e., the relevant community here) and the DEIS discusses the effects thereof.[26] Disputes over or the distribution of economic benefits within the Band do not constitute impacts on the relevant community as a whole and thus they lie outside the scope of environmental justice concerns and OGD O.

B. Cumulative Impacts

Part 5 of OGD O, as admitted, asserts that the ER "needs to look at" Dugway, Deseret Chemical Depot, Tooele Army Depot, Envirocare, Aptus, and Grassy Mountain "as part of the cumulative impacts and disproportionate impacts that the OGD community has been made to suffer." Contentions at 34; LBP-98-10, 47 NRC at 301. As described in detail below, because of the limited emissions of the enumerated facilities, the even more limited emissions from the PFS project, and the great distances between the facilities and the PFSF site, the facilities will cause no significant impacts on or around the Goshute Reservation that could be cumulative with the impacts of the PFSF. Hence, contrary to OGD O, such asserted impacts need not be discussed in the DEIS.[27]

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[25] Metropolitan Edison, 460 U.S. at 777-78. Moreover, in deference to the recognized sovereignty of Indian tribes (see PFS Mot, supra note 24, at 4), federal courts have repeatedly refused to be drawn into intratribal disputes. See, e.g., Tillett v. Lujan, 931 F.2d 636, 642 (10th Cir. 1991) ("[t]o the extent Tillett sought to invoke the jurisdiction of the federal court to decide issues concerning the [tribal council] members' alleged failure to acknowledge their recall and the misuse of tribal funds, the district court properly concluded that such matters were 'clearly intratribal disputes' for which Tillett would have to seek tribal remedies") (footnote and citation omitted); Runs After v. United States, 766 F.2d 347 (8th Cir. 1985) (federal court lacked jurisdiction in an appeal concerning validity of tribal resolutions relating to a tribal election).

[26] As discussed in Section III.A.2, supra, the economic effects of the PFS project on the Band, including the lease payments, the creation of jobs, and PFS expenditures in the area, will be positive.

[27] The DEIS concluded generally that it is unlikely that the Skull Valley Band would suffer any disproportionate and adverse health effects from the construction and operation of the PFSF. DEIS at 6-29.

1. Required Analysis

An EIS must evaluate cumulative impacts in the sense that it must consider how the additional impacts caused by a new project will interact with impacts created by other, pre-existing projects. See Hanly v. Kleindienst, 471 F.2d 823, 830-31 (2d Cir. 1972). A cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.7. An EIS need not consider all conceivable effects a proposal might have, but only those which are reasonably foreseeable. See 40 C.F.R. § 1508.8(b). Furthermore, "when the impacts imposed by [the proposed action] are very small . . . the harm does not flow from [the proposed action] but from the already existing problems and the small incremental increases caused by [the applicant] are acceptable, absent some showing that they are the 'straw that breaks the camel's back.'" Hydro Resources, Inc. (2929 Coors Road, Suite101, Albuquerque, NM 87120), LBP-99-30, 50 NRC 77, 119 (1999), aff'd, CLI-01-4, 53 NRC at 68-70 & n.15 (the focus of the EIS is not merely on pre-existing conditions but on whether the proposed action "will make an appreciable additional impact") (emphasis in original). Specifically, cumulative impacts alleged to result from a proposed action's hazardous emissions may be considered insignificant if the emissions will be a small fraction of allowable emission levels. Hydro Resources, CLI-01-4, 53 NRC at 70.[28] In addition, Federal courts have held that if a project will not result in violations of, for example, applicable clean air pollution standards, no significant impact on the environment will occur. See Association Concerned About Tomorrow, Inc. v. Slater, 40 F. Supp. 2d 823, 830-31 (N.D. Tx. 1998), aff'd, 209 F. 3d 719 (5th Cir. 2000). Thus, if the cumulative level of pollutants from a proposed

[28] Furthermore, mitigation measures are not required where emissions from a proposed action are insignificant, even if the impacts of similar emissions from other actions, with which the impacts of the proposed action would be cumulative, are or were significant. Hydro Resources, CLI-01-4, 53 NRC at 70 & n.15.

action and other actions remains below applicable standards, the cumulative impact of the emissions are also insignificant.

2. The PFS Project Will Cause No Significant Cumulative Impacts

As PFS shows below, 1) the PFS project will have almost no harmful emissions in the first place and 2) the cumulative levels of pollution from the PFS project and the enumerated facilities in OGD O will be significantly below applicable contaminant standards. Therefore, the PFSF and the enumerated facilities will result in no significant cumulative impacts and the DEIS need not discuss the impacts asserted in OGD O Basis 5.

On its part, OGD has provided no information showing that the facilities and the PFSF will have significant cumulative impacts on the Skull Valley Band. In Basis 5 of the contention (and its numerous attachments), OGD only provided information showing that hazardous materials are located at the facilities enumerated in OGD O and are emitted from some of them. See Contentions at 32-34. It provided no information to show any impact on the Band from these facilities, much less any cumulative impact with the PFSF. Further, in response to PFS discovery requests, OGD again provided absolutely nothing to suggest that the facilities and the PFSF will have significant cumulative impacts on the Skull Valley Band. OGD Supp. Resp. at 2.[29] PFS shows below that indeed there will be no significant cumulative impacts.

a. No Significant Groundwater Impacts

Because of the distance between the enumerated facilities and the PFS site, air emissions represent the only conceivable source of cumulative impacts from them. Declaration of George Liang ¶¶ 13-17 (May 24, 2001) (impacts on groundwater from the enumerated facilities, if any, would not be felt in the vicinity of the PFS site). Moreover,

[29] See also Letter from Sean Barnett, counsel for PFS, to Joro Walker, counsel for OGD (Mar. 12, 2001), attached as Exhibit 1 to Applicant's Motion to Compel Answers to Applicant's Discovery Requests to Intervenor OGD (Mar. 28, 2001) (confirming that OGD had not analyzed the cumulative impacts of the enumerated facilities and the PFSF).

the PFSF will have no significant impacts on groundwater or surface water quality in the first place and hence will create no groundwater or surface water impacts cumulative with those of the enumerated facilities. Id. ¶¶ 5-12; DEIS at 4-6, 4-9; see Hydro Resources, LBP-99-30, 50 NRC at 119, CLI-04-01, 53 NRC at 68-70 & n.15. Therefore, the DEIS need not consider potential cumulative impacts other than impacts on air quality from the PFSF and the enumerated facilities.

b. No Significant Air Quality Impacts

The DEIS adequately discussed cumulative impacts on air quality at the PFSF site. The DEIS identified two sources of air emissions at the PFS site during construction, exhaust emissions from construction machinery and fugitive dust. DEIS § 4.3.1. Because of the limited size of the project, "emissions from construction-related equipment are expected to be small." Id.[30] Fugitive dust emissions, however, "would have the greatest influence on air quality during construction." Id.[31] The maximum concentration of dust, i.e., particulate matter 10 microns or less in diameter (PM-10), generated during construction was estimated by air-dispersion modeling. The maximum concentration during any 24-hour period was 22 $\mu g/m^3$, and the annual average concentration was 2 $\mu g/m^3$. The National Ambient Air Quality Standards (NAAQS) for these values are 150 $\mu g/m^3$ and 50 $\mu g/m^3$, respectively. Id. Table 4.2. The DEIS also analyzed the cumulative impact of dust from the PFSF and from neighboring facilities that might contribute to the dust at the PFS site. Id. § 4.3.1. It added projected dust levels from PFS construction to the background concentration, estimated from actual measurements and modeling of dust contributions from other large sources within 50 km, e.g., Dugway Proving Ground and Tooele Army Depot (which are both enumerated in OGD O). DEIS § 4.3.1.[32] The

[30] The PFS equipment will be operated with standard pollution control measures. DEIS § 4.3.4.

[31] PFS will sprinkle disturbed areas with water to reduce dust emissions. DEIS § 4.3.4.

[32] The PM-10 contribution from modeled off-site sources, i.e., Dugway and Tooele Army Depot, was miniscule relative to the measured background PM-10 level. See DEIS at 4-15.

maximum 24-hour cumulative dust level would be 76% of the NAAQS. The maximum annual cumulative level would be only 48% of the NAAQS. DEIS Table 4.2. Thus, the cumulative dust level resulting from the PFS project and other sources in the area would remain below applicable air quality standards and therefore the cumulative impact of the PFS project with respect to dust is insignificant. See Association Concerned About Tomorrow, 40 F. Supp 2d at 830-31. Thus, the DEIS discussion is adequate.

During facility operations, air emissions from the PFSF are expected to include emissions from traffic and the use of equipment at the site.[33] Operational emissions will be smaller than construction emissions and are not expected to significantly impact air quality. See DEIS § 4.3.2.

In addition, not only are the cumulative impacts from dust emissions at the PFSF insignificant, the cumulative air quality impacts considering all air emissions from the facilities enumerated in OGD O Part 5 are insignificant. At the outset, as noted above, PFS will emit contaminants (as opposed to dust) into the air only through the operation of equipment at the site and those emissions will be minimal. DEIS at 4-14, 4-16. Therefore, the cumulative impact of PFS's contaminant emissions with those from other facilities will not be significant and need not be further discussed. See Hydro Resources, LBP-99-30, 50 NRC at 119, CLI-01-4, 53 NRC at 68-70 & n.15.

Nevertheless, PFS explicitly assessed the cumulative impact on the Skull Valley Reservation of air emissions from the enumerated facilities and the PFSF and determined that the impact is insignificant. The attached declaration of George Carruth assesses the impacts of the cumulative air emissions from the PFSF and the facilities listed in OGD O. This analysis shows that because 1) PFS emits almost no hazardous pollutants into the air, 2) the emissions of the enumerated facilities are limited, and 3) the distances between

[33] There will be no radiological air emissions from the PFSF. See DEIS at 2-25, 2-28.

them and the PFS site are great, there are no significant cumulative impacts.

The closest enumerated facility to the PFSF is Dugway. Declaration of George Carruth ¶ 21 (May 24, 2001). The areas at Dugway that handle or store hazardous materials are 18 or more miles away from the PFSF. Id. The other enumerated facilities are all at least 20 miles away. Id. At these distances, the only possible pathway for any emission to accumulate with any emission from a neighboring facility is by air.[34] Mr. Carruth based his cumulative impacts analysis on: 1) environmental impact statements prepared for the Aptus hazardous waste incinerator, the Envirocare mixed waste site, and the Clive hazardous waste incinerator,[35] 2) recent Aptus emissions data, 3) individual risk assessments prepared for the Deseret Chemical Depot and Tooele Army Depot, 4) specific information concerning the particular hazardous materials operations performed at Grassy Mountain and at Dugway, and 5) weather data for Skull Valley. Carruth Dec. ¶¶ 23, 25-39, 38-39, 42-46, 48-59. Mr. Carruth concluded that the level of contaminants in the air at the Reservation as a result of the cumulative emissions from the enumerated facilities is far below the level of significance. Id. ¶¶ 28-30, 34-35, 38, 43, 45, 59. That, combined with the minimal emissions from the PFSF, means that the cumulative impact of emissions from the enumerated facilities and the PFSF will be insignificant. Therefore, PFS is entitled to summary disposition of this portion of Contention OGD O.[36]

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[34] As discussed in Section III.B.2.a above, the PFSF will cause no cumulative groundwater impacts; thus, only air quality impacts were quantitatively analyzed for cumulative impacts here.

[35] The Clive hazardous waste incinerator is not one of the facilities enumerated in OGD O Basis 5. It is located in northern Tooele County, near the Aptus facility. Clive is currently idled and is being closed, but the environmental analysis performed in its Environmental Impact Statement is useful in providing a conservative assessment of potential cumulative effects from the facilities listed in OGD O on OGD and the Skull Valley Goshute Reservation. Carruth Dec. ¶ 20.

[36] Accidents were not mentioned anywhere in OGD O Basis 5, and thus are not within its scope. See note 3 supra. Rather Basis 5 focuses merely on the presence of contaminants at various facilities and references emissions data from some of them. See Contentions at 32-34. Nor does OGD make any reference to accidents at the enumerated OGD facilities or the PFSF in its related discovery responses. OGD 1st Resp., supra note 19, at 5-6; OGD 2nd Resp., supra note 19; OGD Supp. Resp., supra note 23, at 2. Nevertheless, if Basis 5 is read to include accidents, Mr. Carruth's assessment shows that the potential for accidents will not create a significant cumulative impact on the Band. See Carruth Dec. ¶¶ 33-35, 43, 46, 48-58.

C. Property Values

Part 6 of OGD O asserts that "The ER fails to address the effect that the facility will have on property that is owned by members of OGD or by people living in and around the area of the proposed ISFSI site." Contentions at 34-35 (emphasis added). OGD claims that "property values of the surrounding lands will be diminished" by the PFSF and related spent fuel transportation. Id. at 35.[37] PFS is entitled to summary disposition of Part 6 of OGD O for either of two reasons: 1) the DEIS does address property value impacts and 2) property value impacts will be positive.

First, contrary to ODG O, the DEIS does address the impacts of PFSF on local property values. The DEIS notes that specific environmental justice concerns were raised during the scoping process about the potential loss of property values owned by Band members and concludes that the impacts are small to moderate (but beneficial). DEIS § 6.2.1.2 and Table 6.5. At the outset, the DEIS notes the "Reservation itself is not a normal housing market" as property ownership is limited by the Band and reflects only the house itself, not the underlying land. Id. at 6-30. Skull Valley Band members own the land of the Reservation in a unique form of ownership in common and share in the land's use. Id. at 6-30. Band members do not own and cannot alienate individual parcels of land on the Reservation; nor can they sell their interest in the Reservation to non-Band members.[38] Lots are assigned by the Skull Valley Band Executive Committee for the Band member's lifetime and can be transferred to the member's heirs or be assigned to another Band member. Houses or other improvements on the Reservation can only be transferred to another Band member. See DEIS at 6-30.

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[37] OGD also alleged that "fear that these activities engender in the public" would also act to diminish property values. Id. As discussed above, however, psychological impacts, such as "fear," are outside the scope of NEPA, and the Board in admitting Basis 6 ruled that such psychological stress was "not a cognizable basis for the contention." LBP-98-7, 47 NRC at 233. Should OGD renew this argument in its response (see, e.g., OGD 1st Resp supra note 19, at 8), the Board should reject it as before.

[38] See Ex. Order 1465 (1912), Ex. Order 2699 (1917), and Ex. Order 2809 (1918) cited in CHARLES J. KAPPLER, INDIAN AFFAIRS LAWS AND TREATIES, Vol III, 691 and Vol IV, 1049 (GPO 1929); DEIS at 6-30.

As Band members cannot alienate their interests in the Reservation land, changes in demand for housing on the Reservation among Band members would be a suitable surrogate measure of property value. See DEIS at 6-30. Jobs created by the PFSF may make it attractive for Band members to return to the Reservation. Bezdek Dec. ¶ 10. The DEIS recognizes that currently it is not possible to accurately estimate the number of Band members that would move to the Reservation, (DEIS § 4.5.1.1) but concludes that the overall impact on housing values on the Reservation is expected to be a small increase. DEIS at 6-30 to 6-31. Thus the DEIS does address impact on property values and PFS is entitled to summary disposition with respect to Basis 6 of OGD O. Following the Board's reasoning in disposing of Contention Utah C in this proceeding, the analysis in the DEIS renders moot OGD O Basis 6 and hence it can be similarly disposed. See LBP-99-23, supra note 5, 49 NRC at 491-93.

Second, contrary to OGD's assertions, the PFS project will have a positive impact on Band property values. As noted above, regardless of whether Band members live on or off the Reservation, their interest in the land is held in common. E. O. 1465, 2699 and 2809. As the economic situation of the Band improves, the value of each Band member's interest in the Reservation increases. As discussed in Section III.A.2, supra, the DEIS clearly shows that the economic situation of the Band will improve due to PFS lease payments to the Band, an increase in the availability of jobs, and PFS expenditures in the local area. The overall impact on the Band would be a moderate to large benefit. DEIS Table 6.5. Furthermore, lease payments "could be used for a variety of beneficial purposes, including on-Reservation improvements, to housing, schools, day-care, medical facilities, [and] higher education opportunities," DEIS § 4.5.2.8, all of which would increase the value of the Reservation land.

The attached declaration and report from Dr. Bezdek further supports the DEIS's conclusion that the PFS project will have a positive impact on Band property values. Dr.

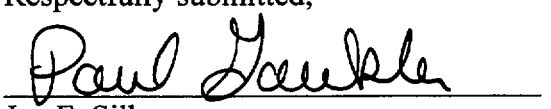
Bezdek based his conclusions on his analysis of other nuclear facilities that have been built in rural areas and the similarity between the PFSF and those facilities and Tooele County and the areas in which the other facilities were located. Bezdek Dec. ¶¶ 4-6. The PFSF would have a positive impact on property values because PFS payments to Tooele County would enable it to provide better education and government services, PFS would provide jobs, and PFS would spend money in the local area. Id. ¶¶ 7-12. These positive impacts would be felt by Band members as well as the County's general population. Id.

The NRC requires, with respect to the environmental justice disparate impact analysis, close scrutiny of "adverse impacts that fall heavily on minority and impoverished citizens . . . ." Claiborne, CLI-98-3, 47 NRC at 106. (emphasis added). As environmental justice considerations are limited to analysis of adverse impacts and PFSF's effect on property values will not be adverse, the PFSF does not give rise to an environmental justice issue as asserted by Basis 6. Thus, even if Basis 6 were read to challenge the adequacy of the DEIS's discussion, PFS is entitled to summary judgment with respect to this portion of Contention OGD O.

IV. CONCLUSION

For the foregoing reasons, the Board should grant PFS summary disposition with respect to OGD O.

Respectfully submitted,



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Dated: May 25, 2001

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	ASLBP No. 97-732-02-ISFSI

STATEMENT OF MATERIAL FACTS ON WHICH NO GENUINE DISPUTE EXISTS

Applicant submits, in support of its motion for summary disposition of OGD O, this statement of material facts as to which the Applicant contends there is no genuine issue to be heard.

A. General

1. Contention OGD O as admitted by the Licensing Board states:

> The license application poses undue risk to public health and safety because it fails to address environmental justice issues. . . . Presently, the area is surrounded by a ring of environmentally harmful companies and facilities. Within a radius of thirty-five (35) miles the members of OGD and the Goshute reservation are inundated with hazardous waste from: Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste strorage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill. Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 233 (1998).

2. In June 2000, the NRC Staff issued NUREG-1714, "Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of

Goshute Indians and the Related Transportation Facility on Tooele County, Utah" ("DEIS").

B. Basis 1 – Economic and Sociological Impacts

3. OGD O Basis 1 asserts:

> The proposed plant will have negative economic and sociological impacts on the native community of Goshute Indians who live near the site. The application demonstrates no attempts to avoid or mitigate the disparate impact of the proposed plant on this minority community.

1. Sociological Impacts

4. The DEIS identifies that the preferred location for the PFSF is in the Northwest corner of the Skull Valley Band of Goshute Reservation, on Reservation land. DEIS Fig. 2.1 and §§ 2.1.1.1, 6.2.1.1.

5. The DEIS discusses potential negative environmental impacts on Band members from increased noise and limited disruption of the visual qualities resource and discusses potential mitigation measures. DEIS §§ 4.8, 4.8.2.8, 6.2.1.2.

6. The DEIS discusses the traffic that will occur near the Reservation and the potential for mitigating its effects. DEIS §§ 4.5.1.6, 4.5.2.6, 4.5.4.

7. The DEIS discusses the numerous surveys for archaeological and historic resources conducted in the project area, including those specific for Native American resources. DEIS § 3.6.2 et. seq. It concludes that no traditional cultural properties or usage of culturally important resources have been documented and that the PFSF will have a minimal, if any, impact on cultural resources. Id. §§ 3.6.2.2, 4.6.1, 4.6.2, 4.6.5.

8. The DEIS specifically recognizes that "[g]eneral issues related to broader cultural values held by some Skull Valley Band members living on the Reservation in proximity to the proposed PFSF have been raised" and that impacts

on natural resources, reverence for the larger area and sacred religious ceremonies have been alleged. DEIS § 4.6.3; see also id. at 6-31. It assessed the potential for such impacts and concluded that construction and operation of the PFSF would have a small potential for affecting Tribal cultural values or traditional cultural properties. Id. at 4-38.

9. The DEIS discusses the potential influx of new residents but concludes that they would have little impact on the population of the area, housing resources, education resources, and utilities. DEIS §§ 4.5.1.1 to 4.5.1.4, 4.5.2.1 to 4.5.2.4.

10. The DEIS discusses the sociological impacts on the Band from the shift in usage of a relatively small parcel of Reservation land from agricultural to industrial usage and notes that access restrictions would possibly preempt some traditional land uses contrary to the desires of some Band members. DEIS at 6-31.

11. The DEIS shows that the PFS project would have a negligible impact on groundwater resources used by Band members. DEIS §§ 4.2.1.2, 4.2.2.3; see id. at 6-27.

2. Economic Impacts

12. The DEIS shows that the economic impact of the PFSF on the Band is positive, in large part because of the lease payments to the Band. DEIS § 4.5.2.8; id. at 6-31.

13. The DEIS shows that the PFSF will have a positive economic impact on the Band from the creation of jobs and PFS expenditures in the region. DEIS §§ 4.5.1.8, 4.5.2.8, 6.2.1.2.

C. Basis 5 – Cumulative Impacts

14. OGD O Basis 5 asserts:

> The PFS Environmental Report ("ER") fails to consider disproportionate cumulative impacts from Dugway, Deseret

Chemical Depot, Tooele Army Depot, Envirocare, Aptus, and Grassy Mountain that may be suffered by members of the Skull Valley Goshutes.

1. Groundwater and Surface Water

15. The PFSF will have no significant impact on groundwater or surface water quality. Liang Dec. ¶¶ 5-12.

16. The enumerated facilities in OGD O are at least 18 miles away from the PFSF. Carruth Dec. ¶ 21.

17. Because of the distance from the facilities enumerated in OGD O to the PFSF site, and the fact that it is highly unlikely that the aquifer under the PFS site and the Reservation is connected to the aquifers under any of the enumerated facilities, emissions into the groundwater at the enumerated facilities, if any, will not have a significant impact on groundwater quality on the Reservation. Liang Dec. ¶¶ 13-17.

18. The PFSF and the enumerated facilities will not have significant cumulative impacts on groundwater or surface water quality. Liang Dec. ¶¶ 12, 17.

2. Air Quality

19. There will be two sources of emissions into the air from the construction of the PFSF: exhaust emissions from construction machinery and dust. DEIS § 4.3.1.

20. PFS emissions from construction machinery will be small. DEIS § 4.3.1.

21. Dust concentrations from the construction of the PFSF would remain below NAAQS levels. DEIS § 4.3.1.

22. The cumulative dust level resulting from the construction of the PFSF and background sources, including Dugway Proving Ground and the Tooele Army Depot, would remain below NAAQS levels. DEIS § 4.3.1.

23. The cumulative impact of PFS dust emissions on the Reservation would not be significant. DEIS § 4.3.1.

24. Air emissions during the operation of the PFSF will consist of exhaust from equipment and will be lower than emissions during construction; thus the cumulative impact of PFS air emissions during operation will be insignificant. DEIS § 4.3.2.

25. The prevailing winds in Skull Valley blow either north to south or south to north; thus it is proper when evaluating cumulative air quality impacts near the PFSF site to consider separately air emission sources to the north of the PFSF, to the south of the PFSF, or to the east or west of the PFSF. Carruth Dec. ¶ 23.

26. Because of the distance from the facilities to the PFSF and the limited level of emissions from them, the cumulative impact of emissions from Aptus, Envirocare, and Grassy Mountain at the Goshute Reservation will be far below significance levels. Carruth Dec. ¶¶ 24-40.

27. Because of the limited distance from the facilities to the PFSF and the limited level of emissions from them, the cumulative impact of emissions from Tooele Army Depot and the Deseret Chemical Depot at the Goshute Reservation will be insignificant. Carruth Dec. ¶¶ 41-46.

28. Because of the distance from the PFSF and the extensive measures taken to prevent the release of hazardous material into the atmosphere, the cumulative impact of emissions from Dugway Proving Ground at the Goshute Reservation will be insignificant. Carruth Dec. ¶¶ 47-59.

29. Because PFS air quality impacts at the Skull Valley Reservation will be insignificant and the cumulative air quality impacts at the Reservation from the facilities enumerated in OGD O are insignificant, the cumulative air quality impacts at the Reservation from the PFSF and the enumerated facilities will be insignificant. Carruth Dec. ¶ 60.

D. Basis 6 – Property Value

30. OGD O Basis 6 asserts:

> The ER fails to address the effect that the facility will have on property values in and around the Skull Valley Goshute community.

31. The DEIS does address the impact of the PFS project on the Skull Valley Band of Goshute community. DEIS § 6.2.1.2 and Table 6.5.

32. The DEIS states that Band members hold the Reservation land in common and cannot alienate their interests in the Reservation land; thus changes in demand for Reservation housing among Band members is a surrogate measure of property value. DEIS at 6-30.

33. The economic situation of the Band members will improve as a result of PFS lease payments, the creation of jobs, and PFS expenditures in the area. DEIS §§ 4.5.1.8, 4.5.2.8, 6.2.1.2, Table 6-5; Bezdek Dec. ¶ 10.

34. Based on Band members potentially returning to the Reservation due to the positive economic impacts of the PFS project, the impact of the PFS project on Band property values is likely to be small but positive. DEIS at 6-30 to -31.

35. PFS will make significant payments to Tooele County in lieu of property taxes. DEIS at 4-36; Bezdek Dec., Exh. 2 at 9, 10.*

36. PFS payments to Tooele County and taxes on PFS purchases will result in better schools, which will benefit Band children and hence increase Band property values. Bezdek Dec. ¶ 8.

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* Management Information Services, Inc., The Impact on the Local Economy and on Property Values of the Proposed Private Fuel Storage Facility in Skull Valley, Utah (May 22, 2001) ("Bezdek Rep.").

37. PFS payments to Tooele County and taxes on PFS purchases will provide for an increase in county services, which will benefit the Band and hence increase Band property values. Bezdek Dec. ¶ 9.

38. As Band members' economic situations improve as a result of PFS lease payments or jobs created by the PFSF, they will tend to buy better housing, which will raise the value of all property on the Reservation. Bezdek Dec. at ¶ 11.

39. The PFS project will not affect the fact that Band members on the Reservation do not need to pay property taxes. Bezdek Dec. ¶ 12.

40. The PFS project will have a positive impact on Band property values independent of the lease payments PFS will make to the Band directly. See Bezdek Dec. ¶¶ 9-12.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	ASLBP No. 97-732-02-ISFSI

CERTIFICATE OF SERVICE

I hereby certify that copies of Applicant's Motion For Summary Disposition of OGD Contention O – Environmental Justice, the Statement of Material Facts on Which No Genuine Dispute Exists, and the Declarations of Roger Bezdek, George Carruth, and George Liang were served on the persons listed below (unless otherwise noted) by electronic mail with conforming copies by U.S. mail, first class postage prepaid, this 25th day of May 2001.

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Paul Gaukler

Paul A. Gaukler

Document #: 1118936 v.1

May 25, 2001

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	ASLBP No. 97-732-02-ISFSI

ATTACHMENTS FOR
APPLICANT'S MOTION FOR SUMMARY DISPOSITION OF
OGD CONTENTION O – ENVIRONMENTAL JUSTICE

Tab No.	Subject
A.	Declaration of Roger Bezdek
B.	Declaration of George Carruth
C.	Declaration of George Liang

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	

DECLARATION OF ROGER BEZDEK

Roger Bezdek states as follows under penalties of perjury:

1. I am currently President of Management Information Services, Inc. I am providing this declaration in support of a motion for summary disposition of OGD Contention O (OGD O) in the above captioned proceeding to show that the Private Fuel Storage Facility (PFSF) will have a positive impact on property values on and around the Skull Valley Band of Goshute Indians Reservation.

2. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this declaration. I have a Ph.D. in Economics from the University of Illinois (Urbana), and am the author of four books and of 200 articles in scientific and technical journals relating to economic and energy analysis. I have 30 years experience in consulting and management in the energy, utility, environmental, and regulatory areas, and have served numerous clients in the public and private sector. My experience relative to the current Contention includes analyses: (a) of the impact on property values in the surrounding areas of seven existing nuclear facilities in different states and the direct and indirect economic impacts of the construction and operation of the facilities, (b) of the economic impact of the gaseous diffusion plants in Paducah, Kentucky and Portsmouth, Ohio, (c) of the impact of projected revenues from the Shoreham

nuclear facility on the tax base of Suffolk County, New York, (d) of the economic impact on the local economy of Eastman Kodak's industrial facilities in Rochester, New York, (e) of environmental justice issues related to electric power plants, waste disposal facilities, oil refineries, and large industrial and commercial facilities, (f) of the economic and employment impacts of the industrial and commercial use of nuclear technologies, and (g) of other studies.

3. OGD O asserts that, "The license application poses undue risk to public health and safety because it fails to address environmental justice issues. . . ." Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 258 (1998). OGD O Basis 6 claims that the PFSF Environmental Report fails to address the effect that the facility will have on property owned by members of OGD or other members of the Skull Valley Band of Goshute Indians living on or around the Skull Valley Reservation. The Licensing Board has limited Basis 6 to the effects of the PFSF on property values as a component in the environmental justice assessment of any disparate impacts suffered by minority and low-income communities. Id. at 233.

4. The attached report (Exhibit 2) discusses the impact on property values on the Reservation of the proposed PFSF. It also discusses the impact on the local economy and how that impact will positively affect property values. The research in this report is based on my two decades of research on the direct and indirect economic impacts of nuclear facilities and other large industrial and commercial facilities (including environmental justice issues), economic and statistical analyses conducted as part of this research, review of the literature and relevant research, and specific analyses of the impacts of individual nuclear facilities on their surrounding areas. More specifically, since 1985, I have analyzed the direct and indirect economic and social impacts of nuclear and other facilities for clients that include IBM, Eastman Kodak, Raytheon, Lockheed Martin, the Edison Electric Institute, the Electric Power Research Institute, various universities, and

the Federal and state and local governments. These analyses included the impacts on sales, profits, jobs, tax revenues, property values, economic development, and various socioeconomic variables, as well as on factors relating to environmental justice concerns.

5. Exhibit 2 documents my assessment of the impacts on property values and other economic indicators of seven nuclear facilities on the areas adjacent to them: (a) The nuclear waste management facility operated by Chem-Nuclear Systems LLC in Barnwell County, South Carolina; (b) the Waste Isolation Pilot Plant, a transuranic waste disposal facility operated by TRU Solutions LLC, 26 miles east of Carlsbad, New Mexico; (c) the Envirocare mixed waste disposal facility in Clive, Utah (Tooele County); (d) the South Texas Project Nuclear Generating Station in Matagorda County, Texas; (e) the River Bend Nuclear Generating Station in West Feliciana Parish, Louisiana; (f) the Callaway nuclear power plant in Callaway County, Missouri; and (g) the Wolf Creek Generating Station nuclear power plant in Coffey County, Kansas.[1]

6. Exhibit 2 also documents my observations and analysis from my review of the relevant literature and research relating to the economic impacts of nuclear and other industrial/commercial facilities and the use that is made by local governments of the increased revenues generated by these facilities. This review included published research papers and professional journal articles, analyses of the impacts on economic development, tax revenues, property values, and related

[1] In addition, Exhibit 2 documents the economic and statistical analyses I conducted by analogy to the results of a study of the Owl Creek Project in Wyoming by the University of Wyoming and by utilizing statistical databases and analyses published by the U.S. Bureau of the Census, the U.S. Bureau of Economic Analysis, the U.S. Energy Information Administration, the U.S. Bureau of Labor Statistics, the U.S. Nuclear Regulatory Commission, the State of Utah, and other Federal and state government sources. As the size, scope and function of the Owl Creek Project and the PFSF are similar, I was able to assess the direct economic effects of the PFSF, analyze the potential impact of the PFSF on the surrounding area, and validate these estimates based on analysis of studies of similar facilities.

variables conducted by independent analysts, professional associations, and research institutes, and discussions with knowledgeable experts in the field.

7. The report supports my conclusion that the PFSF will have a positive impact on the value of property of the members of the Skull Valley Band of Goshute Indians living the near the facility. Our research has shown there are five major factors that influence property values: Quality of local schools, availability of municipal services, availability of jobs and other income sources, quality of real estate, and reasonable property tax assessments. The PFSF will have a positive impact on the first four factors and a no impact on the last, as there are no property taxes on the Reservation. Since the PFSF will have a net positive impact on the factors that influence property values, I conclude that local property values will go up.

8. Increasing quality of schools is a prime determinate of increasing property values. Tooele County government revenues will increase directly due to PFS direct payments and indirectly due to taxes and fees on PFSF expenditures for such needs as materials and labor during construction and wages during operations. Tooele County would be expected to follow the pattern of other similar counties and use much of the increased revenue to support county schools. The Band's children living on the Reservation attend schools on Dugway Proving Ground that are operated by the county. Also, the lease payments to the Band from PFS could be used to fund scholarships or similar educational opportunities for Band members. Therefore, PFSF would be expected to have a significant positive impact on the quality of educational opportunities available to Band members living on the Reservation.

9. The PFSF is expected to result in a net increase in available municipal services in addition to education services. Tooele County would be expected to follow the pattern of other similar counties and use some of the increased revenue due to PFS to increase municipal services. Band members living on the Reservation and the surrounding area rely on the municipal services provided by the county,

including police and fire services. Also, the lease payments to the Band from PFS could be used to fund increased availability of health care or recreation resources on the Reservation. In addition, emergency equipment at the PFSF would be available to supplement existing response capability as needed. Therefore, PFSF would be expected to have a positive impact on the availability of municipal services available to Band members living on the Reservation.

10. The PFSF is expected to generate associated direct and indirect jobs and these jobs are likely to be higher paying than jobs currently available in the County. Moreover, Band members will receive first consideration for jobs at the PFSF. As the employment currently available on the Reservation consists of volunteer positions, the PFSF will be a significant boost to the economy on the Reservation. The number of jobs created are significant in relation to the size of the Band and provide job opportunities for Band members who wish to return.[2] Therefore, PFSF would be expected to have a positive impact on availability of jobs on and near the Reservation, including availability of jobs for Band members.

11. My research, as discussed in Exhibit 2, has shown that employees of nuclear facilities demand improved quality of housing compared to that typically available in rural counties. Also, to the extent that workers at PFSF will be higher paid than others in the county, I expect an increase in the quality of real estate as the market responds to this demand. In addition, to the extent PFS lease payments to the Band are used to increase the disposable income available to the Band members and the members use the increased income to improve their personal property (like their houses), there can be an expected increase in the quality of real estate on the Reservation. The increased quality of new real estate would

[2] Band Chairman Leon Bear has indicated that Band members are likely to return to the Reservation to take advantage of job opportunities. Letter from Leon D. Bear, Chairman, Skull Valley Band of Goshute, to Mark Delligatti, U.S. NRC (Feb. 16, 1999).

likely result in a "halo" effect that would increase the value of all real estate even if it itself is not improved.

12. In conclusion, my analysis of the five main factors that drive property values indicates that property values on and around the Skull Valley Band of Goshute Indians Reservation will increase. It is reasonable to expect that educational opportunities will improve, municipal services will become more available, job opportunities will increase[3] and quality of housing will improve, while there will be no adverse impact on the Reservation's current exemption from property taxes. My research indicates that these factors are more controlling of property values and will more than compensate for any initial negative perceptions of locating a nuclear facility nearby.

I declare under penalties of perjury that the foregoing is true and correct.

Executed on May 22, 2001.

Roger Bezdek

Document #: 1117832 v.1

[3] Initial job opportunities for Band members at the PFSF may be limited due to qualification requirements, but it is likely that available job opportunities will increase over time as Band members take advantage of increased educational opportunities.

Bezdek Declaration Exhibit 1

Resume

Dr. Roger H. Bezdek, President
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Dr. Bezdek has 30 years experience in consulting and management in the energy, utility, environmental, and regulatory areas, serving in private industry, academia, and the Federal government. His consulting background includes analysis of the economic benefits of nuclear facilities to adjacent areas, analysis of the Environmental Justice issue and its implications for the electric power industry, the economic and jobs impact of nuclear power plants, the economic benefits of nuclear technologies, estimation of Federal incentives for energy development, assessment of the economic effects of environmental and energy technologies, energy industry forecasting, environmental impact assessments, expert witness testimony, and assessment of environmental regulations. Dr. Bezdek has served as Corporate Director, Corporate President and CEO, University Professor, Research Director in ERDA/DOE, and U.S. energy delegate to the European Community and to the North Atlantic Treaty Organization. He has served as a consultant to the White House, Federal and state government agencies, and various corporations and research organizations, including the Nuclear Energy Institute, the American Nuclear Energy Congress, Organizations United for Responsible Low-Level Radioactive Waste Solutions, the U.S. Council for Energy Awareness, IBM, Commonwealth Edison, Raytheon, AEP, Eastman Kodak, Lockheed Martin, Washington Gas Co., Textron, AT&T Bell Laboratories (Lucent Technologies), the National Academy of Sciences, the American Management Association, ICF, A.D. Little, the Electric Power Research Institute, and the Edison Electric Institute. While with ERDA/DOE he founded the Federal government's energy incentives and risk assessment program. He has prepared testimony and served as an expert witness before state and Federal regulatory agencies in Washington, D.C., New York, California, Illinois, and Wisconsin.

Dr. Bezdek received his Ph.D. in Economics from the University of Illinois (Urbana), is an internationally recognized expert in economic forecasting and environmental and energy analysis, and is the author of four books and of 200 articles in scientific and technical journals. He is the recipient of numerous honors and awards (including awards from the National Science Foundation, the White House, the *Wall Street Journal*, the Association for Computing Machinery, and the USSR Academy of Sciences), has served as a U.S. representative to international organizations on environmental and energy issues, and lectures frequently on economic forecasting, energy, and environmental topics.

MANAGEMENT INFORMATION SERVICES, INC.

Management Information Services, Inc. is a Washington, D.C.-based economic research and management consulting firm with expertise in the analysis of energy, electric utility, and environmental programs, economic forecasting, IM/MIS, Internet and Intranet systems, and human resource issues, and serves both U.S. and foreign clients. The MISI staff offers expertise in economics, information technology, engineering, and finance, and includes former senior officials from private industry, Federal and state government, and academia. Over the past two decades MISI has conducted extensive proprietary research, and since 1985 has assisted hundreds of clients with:

- Market Research and Forecasting
- Business Plan Development
- Industry and Product Analyses
- Internet and Intranet Solutions
- Economic and Employment Forecasting
- Utility Industry Analyses
- Energy and Environmental Data Systems
- Information Systems and Services
- Expert Witness Testimony

The MISI web site is http://www.misi-net.com

Dr. Roger H. Bezdek

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Bezdek Declaration Exhibit 2

The Impact on the Local Economy and on the Property Values of the Proposed Private Fuel Storage Facility in Skull Valley, Utah

THE IMPACT ON THE LOCAL ECONOMY AND ON PROPERTY VALUES OF THE PROPOSED PRIVATE FUEL STORAGE FACILITY IN SKULL VALLEY, UTAH

Prepared for Private Fuel Storage, LLC
LaCrosse, WI

By

Management Information Services, Inc.
Washington, D.C.

May 2001

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Introduction

A consortium of eight nuclear utility companies has formed Private Fuel Storage LLC to develop and operate a spent fuel storage facility on an 820-acre site on the Reservation of the Skull Valley Band of Goshute Indians (the Band) in Skull Valley, Utah, 40 miles southwest of Salt Lake City. Ohngo Gaudadeh Devia (OGD) is contending that the facility will have an adverse effect on property values of the Goshute Band[1] and have other adverse economic impacts on Band members living on the Reservation.

This paper addresses these and related issues by assessing the likely economic impact of the PFS facility on the Band and the surrounding area. Management Information Services, Inc. (MISI) assesses:

- The impact of the PFS facility on local property values. (Chapter I)
- The impact on the Band resulting from PFS expenditures. (Chapter II).
- The impact on the Band that will result from PFS payments to Tooele County, including how the consequent increased county services would benefit the Band and increase property values. (Chapter III)
- The impact on the Band resulting from PFS expenditures in Tooele County (Chapter IV).
- Other impacts on the Band from changes in local conditions (Chapter V).
- The impact of changed economic conditions on the Band regarding the retention of younger residents on the Goshute Reservation. (Chapter VI).

Background

Our analysis is based on MISI's two decades of research on the direct and indirect economic impacts (including environmental justice issues) of nuclear facilities and other large industrial and commercial facilities, economic and statistical analyses conducted as part of this research, review of the literature and relevant research, and analyses of the impacts of other nuclear facilities on their surrounding areas.[2] More specifically:

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[1]The "Goshute Band" refers to Band members living on or around the Skull Valley Reservation.

[2]Examples of the sources utilized in the research include statistical databases and analyses published by the U.S. Bureau of the Census, the U.S. Bureau of Economic Analysis, the U.S. Energy Information Administration, the U.S. Bureau of Labor Statistics, the U.S. Nuclear Regulatory Commission and other Federal agencies; previous MISI analyses of the economic impact of Eastman Kodak's industrial facilities in Rochester, New York, of the impact of the revenues from the Shoreham nuclear facility on the tax base of Suffolk County, New York, of the impact of five nuclear facilities on the surrounding areas, of the direct and indirect economic effects of the construction and operation of nuclear power

- Since 1985, MISI has analyzed the direct and indirect economic and social impacts of nuclear and other facilities for clients that include IBM, Eastman Kodak, Raytheon, Lockheed Martin, the Edison Electric Institute, the Electric Power Research Institute, various universities, and the Federal and state and local governments. These analyses included the impacts on sales, profits, jobs, tax revenues, economic development, and various socioeconomic variables, as well as on factors relating to environmental justice concerns.

- Additional economic and statistical analyses were also reviewed for the purpose of preparing this report, including an econometric analysis as part of preliminary planning for a potential similar independent spent fuel storage facility in Owl Creek, Wyoming. As the size, scope and function of the Owl Creek Project and the PFSF are similar, I was able to assess the direct economic effects of the PFSF, analyze the potential impact of the PFSF on the surrounding area, and validate these estimates based on analysis of studies of similar facilities. These included assessments of the direct economic effects of the Private Fuel Storage facility, econometric analyses of the potential impact of the PFSF on the surrounding area, and statistical validation of these estimates based on analysis of studies of similar facilities.

- MISI reviewed and analyzed the relevant literature and research relating to the economic impacts of nuclear and other industrial/commercial facilities and the use that is made by local governments of the increased revenues generated by these facilities. The review included published research papers and professional journal articles, as well as discussions with analysts knowledgeable in the area.

The seven nuclear facilities whose socioeconomic impacts on adjacent areas MISI assessed included:

- The nuclear waste management facility operated by Chem-Nuclear Systems LLC in Barnwell County, South Carolina.

- The Waste Isolation Pilot Plant (WIPP), a transuranic waste disposal facility operated by TRU Solutions LLC, 26 miles east of Carlsbad, New Mexico.

- The Envirocare mixed waste disposal facility in Clive, Utah.

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plants, of the gaseous diffusion plants in Paducah, Kentucky and Portsmouth, Ohio, and other studies; economic analyses of the impacts on economic development, tax revenues, and related variables conducted by independent analysts, professional associations, and research institutes; and discussions with knowledgeable experts in the field. As noted, these sources are discussed in the Appendix.

- The South Texas Project (STP) Nuclear Generating Station in Matagorda County, Texas.

- The River Bend Nuclear Generating Station in West Feliciana Parish, Louisiana.

- The Callaway nuclear power plant in Callaway County, Missouri.

- The Wolf Creek Generating Station (WCGS) nuclear power plant in Coffey County, Kansas.

Of these, the Barnwell, WIPP, and Envirocare facilities represent the nearest approximation to the PFSF:

- Barnwell has been operating since 1971 and the Chem-Nuclear disposal operations currently have about 75 employees, compared to the 40-50 employees estimated for the PFS facility.

- The WIPP facility opened in 1999 and has an estimated 35 year life, compared to the estimated 40 year life of the PFS facility, and the adjacent region shares geographic and demographic characteristics with Tooele County.

- Over the past decade, Envirocare of Utah, Inc. has been operating a waste disposal facility in Clive, Utah (Tooele County) capable of accepting wastes that contain both radioactive and hazardous contaminants.

While it is recognized that the nuclear generating stations are considerably larger in employment and associated socioeconomic impacts than the PFSF, the four sites selected, Matagorda, Callaway, and Coffey Counties and West Feliciana Parish, share some characteristics with the PFSF and the surrounding area. Prior to the construction of the nuclear power stations, these counties and the parish were economically depressed similar to the Skull Valley Reservation. In terms of jobs added by the nuclear generating stations as a fraction of county population, the economic impacts are relatively smaller than the jobs created by the PFSF compared to the Reservation population. Similarly, the ratio of the expenditures by the nuclear generating stations compared to the associated county income is relatively smaller than the expenditures of PFS compared to Band income. Because of these similarities, and the fact that nuclear plants, like the PFSF, are both temporary facilities licensed to operate for a specific number of years, it was deemed useful to include power plants in the analysis.

I. The PFSF's Impact on Skull Valley Band Property Values

Based on analysis of the impact of similar facilities, one would expect that property values will benefit from the PFSF, and, specifically, that on and around the Skull Valley Reservation property values will increase. In analyzing the impact of similar facilities around the country MISI found that:

- In the areas adjacent to the nuclear facilities, total property values, assessed valuations, median housing prices, and per capita real estate values increased at rates above the national and state averages[3].

- The presence of a nuclear facility protected property values: During periods of relative economic decline in the local region, the economic stability, including steady employment, provided by the facility prevented property values from decreasing, as they did elsewhere in the state and the surrounding communities. That is, the nuclear facilities protect property values from a "boom and bust" cycle, such as by helping stabilize employment and income as downturns in agriculture, mining, and other local industries occurred.[4]

- The revenues from the facilities permit local jurisdictions to provide infrastructure and other services to attract business and industry, which also helps to support both the commercial and residential real estate markets.[5]

- The revenues provided by the nuclear facilities fund improved local educational systems, and the quality of local schools is a prime determinant of real estate values.[6] In fact, the revenues provided by the nuclear facilities have allowed the jurisdictions to develop some of the best educational systems in their respective states and to hire the most qualified teachers.[7]

- The nuclear facilities create incomes and jobs not only for employees, but also for suppliers, contractors, and service workers, and these incomes and

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[3]Research Appendix To *The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* Prepared for Private Fuel Storage, LLC by Management Information Services, Inc., May 2001.

[4]Ibid. Like any large construction project, a one-time boom-bust cycle occurs at the completion of construction and shift to operations. The average stabilizing effect is seen for nuclear power stations despite this one-time cycle. The one-time cycle for PFS is likely even less significant as the fraction of operational jobs compared to construction jobs is relatively larger for PFS than a nuclear power station.

[5]Ibid.

[6]Ibid.

[7]Skull Valley Band children attend schools on Dugway Proving Ground that are administered by Tooele County.

jobs also help support the local real estate market.[8] Here, the PFSF will provide job opportunities for the Band that will give Band members an incentive to move back to the Reservation.

- In the local areas, housing prices were five to ten times higher than prior to the facilities' construction, and had been increasing more rapidly than the national average for two decades.[9]

- In the area around the newest facility -- WIPP, the housing market has been booming since it began operations.[10]

In general, there are five major factors that influence property values, and PSFS will have a positive or neutral impact on each factor:

- First, the quality of the available real estate is important, and, as noted above and in Chapters II and VI, development of PFSF will stimulate construction of quality housing as Band members may return to the Reservation to take the jobs created directly or indirectly by the PFSF.

- Second, good schools are a prime determinate of property values and, as discussed in Chapter III.A, the revenues generated by PFSF are likely to improve the schools attended by Band children.

- Third, reasonable property tax assessments are important. Since the Band does not pay property tax, the PFSF will have no impact on this factor.

- Fourth, adequate public services and infrastructure are important and, as discussed in Chapter III.B, the revenues generated by PFSF will permit a higher level of public services to be provided, some of which are used by Band members, including those living on the Reservation.

- Finally, jobs and incomes in the local economy are obviously critical, and, as discussed in Chapters IV and V, PFSF will provide (directly and indirectly) local jobs and incomes for members of the Band and for other local residents.

On the basis of MISI research on the effects of nuclear facilities in different parts of the country on property values in the adjacent areas, MISI concludes that the PFSF will have a strong

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[8]Research Appendix To *The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit.

[9]Ibid.

[10]Ibid.

positive effect on property values. In the areas immediately surrounding all of these facilities, property values have increased substantially over the past two decades and continue to do so. Local residents and community leaders are strongly supportive of the nuclear facilities, and there is no negative impact on property values from the proximity of the facilities or from unwarranted perceptions about nuclear facilities.

MISI thus concludes that, if the Private Fuel Storage Facility is licensed, it is reasonable to infer that property values will be enhanced.

II. Benefits to the Band That Result From PFS Expenditures

The Band will receive substantial direct and indirect revenues from the PFSF expenditures. Based on MISI research, MISI would expect the Band to use the increased revenues for beneficial projects, like similarly situated county governments do. The Band could use these revenues to provide members benefits, including:

- Revenues for tribal government to support education, training, and housing.
- Private healthcare for all tribal members (the closest Indian Health Services are currently more than 200 miles away).
- Improved infrastructure for future development.[11]
- Preference in hiring tribal members who qualify for jobs at the facility.
- Job potential in related manufacturing businesses.

As discussed below, one of the expected benefits to Tooele County is improved law enforcement services. Through its cooperative agreement on law enforcement with the county, the Band Reservation will also receive the benefit of any improvement in county law enforcement services.

III. The Positive Impact on the Band Resulting from Payments to Tooele County

III.A. County Governments' Allocation of Increased Revenues Generated From Large New Industrial Facilities

In addition to the positive effect on Band property values caused by the PFSF and the benefits from the direct payments made to the Band, the Band will also benefit indirectly from the payments PFSF will make to Tooele County.

MISI research indicates that, in general, how county governments allocate the increased revenues generated from taxes and fees from a large new industrial facility, or a facility similar to the PFSF, depends on several factors.

[11] Specific upgraded infrastructure items are expected to include electrical, telecommunications and mail services.

First, if the governments view the increased revenues as a one time lump sum revenue windfall, they will allocate the increased funds to capital projects, such as roads, bridges, school buildings, etc.[12] Here, PFSF will make payments to the county over the life of the PFSF, so it is unlikely that Tooele County would treat the payments like a lump sum.

Second, in the case where the governments view the revenues to be recurring on an annual basis as will be the case with the PFSF, they will divide the increased revenue stream between tax reductions and earmarking for special purposes -- usually education. Local governments are reluctant to reduce taxes significantly because, once taxes are lowered, it is usually difficult politically to raise them, even when economic and fiscal conditions require it. Therefore, the preferred option is usually earmarking a major portion of the increased revenues for purposes that have strong local political support, such as education.[13] As noted above, Band children attend schools on Dugway Proving Ground that are administered by Tooele County.[14]

More specifically, we found that local governments in areas where nuclear facilities are located usually allocate the increased revenues generated to education, to tax relief, and for improvements in local infrastructure designed to attract other business and industry.[15]

Reflecting what is important to county residents, the taxes and fees paid are most frequently devoted to education and are used to support high quality local educational systems that:

- Rank higher than state averages for attendance, the number of teachers certified to teach in the subjects they teach, the number of graduate degree teachers, and teacher evaluation scores.

- Have test scores that are higher than the national averages.

- Have teachers that are among the highest paid and most qualified in the respective states, a high percentage of whom hold advanced degrees.

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[12]Ibid, Chapter X; and as determined in discussions with officials from the National Association of Counties and the Council for Urban Economic Development, April 2001.

[13]Ibid.

[14]Tooele County receives a Title 9 grant each year from the Federal Indian Education Fund for educating the Indian children attending the Dugway schools. However, the funds receives total only about $400 - $500 per Indian child, whereas the annual cost to educate a student in the Tooele County schools is $3,800. The County pays the difference -- nearly 90 percent of the cost of educating the Goshute children attending the Dugway schools -- with County General Funds. Therefore, the increased revenues for education to Tooele County from PFSF will substantially benefit the Goshute children attending the Dugway schools.

[15]Research Appendix To *The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapters I-VII.

In total, the nuclear facilities have resulted in billions of dollars in earmarked revenues for education in the states and local communities in which they are located. Although PFSF payments would not be this large, a proportionate impact could be expected.

Another important advantage is that the facilities have been very generous in directly supporting local schools and community activities. Although smaller than the nuclear generating stations studied, PFSF can be expected to proportionately generous in similar ways. Support that nuclear facilities provide to their neighboring communities include[16]:

- Funded scholarships. In fact, PFS already has an internship program in which Band members have participated. [17]
- Provision of funds for classroom equipment, multi-media training materials, science kits, computers, printers, monitors, and software.
- Development of formal assessment methodologies and tools for science instruction.
- Sponsored seminars and conferences for teachers and school administrators.
- Sponsored teacher training workshops.
- Assisted schools and school districts in preparing winning proposals for grants from foundations and from the state and Federal governments.
- Improved the local social and cultural atmosphere through employee support of libraries, civic organizations, and the arts.

An important advantage of the large revenue base provided by the nuclear facilities is that it permits the local school districts to generate capital funds for facilities and school purchases of equipment and materials. In this respect, these districts have significantly better facilities than the surrounding school districts.[18]

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[16]See *Research Appendix To The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapters I – VII and Chapter X.

[17] For example, six Band members have already participated in the intern program offered by PFS to work at nuclear power plants or Stone and Webster where they learn maintenance, security, health physics, engineering and emergency planning. One Band member has used the intern experience to obtain work at a nuclear facility in Colorado.

[18]Ibid.

In addition to improving education, the local government revenues provided by the facilities have also allowed the local jurisdictions to upgrade their infrastructure and their provision of municipal services to attract new business. Some of the jurisdictions have used a portion of these revenues to purchase industrial buildings and machinery. The combination of low property taxes, above-average municipal services, and relatively inexpensive plant and equipment costs has been successful in attracting small and medium-sized industries.[19]

The facilities' positive contributions to the local jurisdictions' overall quality of life also serve as a tool in recruiting industries. The tax base, employment, and salaries that the facilities provide encourage commercial development and have helped make the regions' economies more stable.[20]

The facilities' tax and fee payments are responsible for improving the jurisdictions' hospitals, roads, sewers, schools, and recreation facilities, and these improvements are a selling point to industrial prospects. Also, the facilities bring a more highly educated, technical work force to the area and their employees support the types of community improvements that are attractive to industries. Since the facilities have begun operation, new industries have located in the jurisdictions and nearby towns.[21]

The facilities' tax and fee payments and overall positive contributions to the adjacent jurisdictions' quality of life have enabled several of the local areas to develop industrial parks and to attract significant industrial development for the first time[22].

Tooele County will likely follow a similar pattern of expenditures and allocation:

- Tooele is one of the most rapidly growing counties in Utah, and its population increased 53.1 percent between 1990 and 2000.
- The rapid growth in population and school enrollments has placed great pressure on the county's educational and infrastructure resources.
- Tooele County has signed an agreement with PFS that could result in increased revenues to the county of over $90 million in fees over the life of the PFSF.[23]

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[19]Ibid.

[20]Ibid.

[21]Ibid.

[22]Ibid.

[23]Since the PFSF is on the Goshute Reservation, it is not required to pay county taxes.

- County officials are committed to using the revenues to benefit the county's citizens and improve their lives.[24]

- County officials have stated that education and pubic safety will be two of the highest priorities for use of the revenues.[25]

- The $90 million over 20 years is a meaningful increase in funds available to the county. For comparison, the size of current county expenditures in 1999 totaled:
  - -- $5.5 million for general government functions
  - -- $5.8 million for public safety
  - -- $32.1 million for education

- PFS is already paying the county $5,000 per month for educational programs and other needs.[26]

Tooele County and the state of Utah will receive substantial direct and indirect benefits from the PFS facility, as a significant portion of the total $3.2 billion facility cost that will be spent in Utah could be spent in the local area, generating additional tax revenues and injecting money into the local economy, as discussed below.

III.B. Benefits to the Band From Increased County Services

The increased county services that are likely to result from the PFS project and the payments PFS will make to Tooele County will substantially benefit the Band and increase local property values. Even though some Band members live on the Reservation rather than in the county, *per se*:

- Band children attend a school on Dugway Proving Ground that is administered by Tooele County.

- Band members can use the county services, such as parks, recreational, cultural, and public health and safety services..

- Some work in the county.

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[24]See Judy Fahys, "Tooele Signs Deal for N-Waste," *The Salt Lake Tribune*, May 25, 2000; "PSF, Tooele County Agree on SF Storage Benefits," *Nuclear Waste News*, June 1, 2000, p. 213; "PSF, Tooele County in Historic Agreement." *Inside Look*, Summer 2000, p.1, http://www. privatefuelstorage.com/newsletters/lLfall99.pdf; and Jerry D. Spangler, and Donna M. Kemp, "Tooele Inks Deal on N-storage Pact; is Worth About $500,000 a Year For County," *The Desert News*, May 24, 2000.

[25]Ibid.

[26]"PSF, Tooele County Agree on SF Storage Benefits," op.cit.; ; Judy Fahys, "Tooele Signs Deal for N-Waste," op. cit.

- Band members living in the county (including those living both on and off of the Reservation) will benefit from increased county services such as health, safety, parks and recreation, etc.

- The enhanced quality of life, infrastructure, and level of public services in the county permitted by the PFS revenues will benefit all Band members.

Further, all local jurisdictions benefit from the increased spending on educational opportunities and the commensurate increase in the quality of the educational system that the PFSF revenues will facilitate. Although the PFSF is much smaller than the nuclear generating stations; its economic benefits to the Skull Valley Band are larger, relatively speaking, than the economic benefits of the nuclear generating stations to the counties in which they are located. Thus, the economic impacts of the nuclear power plants analyzed by MISI remain relevant to the economic benefits that will accrue to the Band from the PFS project.

Finally, Band members will benefit as local property values will likely be greatly enhanced, as discussed in Chapter I.

IV. The Positive Impact on the Band Resulting From PFS Expenditures in Tooele County

IV.A. Impact on Tooele County Resulting From PFS Expenditures

The potential beneficial impact on Tooele County (and indirectly on Band members) of PFS expenditures during construction and operation of the PFSF, including wages and purchase of services and construction materials, is substantial. To estimate these impacts, MISI assumed that the PFS facility will begin construction in 2002, commence operations during 2004, receive spent fuel through 2025, remove fuel to the federal repository from 2025 to 2045, and then decommission the site. MISI's estimates are based on the current proposed configuration of the PFS site, e.g., a 100-acre storage area, above ground storage of up to 4,000 casks, 40 - 50 permanent on-site workers, etc. Based on econometric input-output analysis performed as part of preliminary planning for a similar independent spent fuel storage facility at Owl Creek, Wyoming[27], MISI estimates that the impact on Tooele County identified in the DEIS are reasonable. Results of the Wyoming study are consistent with DEIS § 4.5, and MISI would expect that the impacts of PFSF will be:

- During the construction phase, 2002 - 2004, 382 direct and indirect jobs and $23 million in income per year.

- During the receipt of spent fuel, 2005 - 2025, 64 direct and indirect jobs and $3 million in income per year.

[27] *Research Appendix To The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapter VIII.

- During the phase in which fuel is removed to the federal repository, 2025-2045, about 200 direct and indirect jobs and $10 million in income.

- During the phase in which the site is decommissioned, about 375 direct and indirect jobs and $34 million in income.

The permanent, on-site jobs will include well paid, skilled workers such as mechanics/operators, radiation protection technicians, site security staff, quality assurance workers, administrative staff, nuclear engineers, and emergency preparedness coordinators. PFS has pledged to give preference to local workers for these and related jobs, including members of the Goshute Band and residents of Tooele County.[28]

In addition, PFS will give preference to local fabricators for casks and canisters, which are valued at up to $1.8 billion over the project's life. The storage system designers have already met with local potential manufacturing firms and local steel fabricators, including the Tooele Industrial Depot.[29] The jobs and incomes benefits to Tooele County of local cask manufacturing and fabrication would be very substantial and would be several times as large as the benefits given above.

IV.B. Benefits to the Band Flowing From Positive Economic Impacts on Tooele County That Result From PFS Expenditures

The Band members will indirectly benefit from the increased prosperity in Tooele County that results from PFS expenditures. For example, revenue at the Band-operated Pony Express Convenience store will likely increase, tourism may increase, Band members will benefit from the improved Tooele county infrastructure that the PFS payments will facilitate, they will be able to use the improved educational and recreational services that Tooele County will be able to provide, etc. Some of these benefits are relatively small in total. However, the Band is small, consisting of 112 persons, of whom only 15 live on the reservation. Thus, in relation to the Band, these indirect benefits are large and important.

The nuclear facilities have also provided many other types of economic benefits to the local jurisdictions.[30] The Band would likely benefit from actions by PFS similar to these performed by other facilities:

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[28]http://www.privatefuelstorage.com/benefit/tooele.html.

[29]"Jobs, Other Economic Benefits Will Come With PFS License," *Inside Look*, Fall 1999, p.1; http://www.privatefuelstorage.com/newsletters/ILfall99.pdf

[30]*Research Appendix To The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapters I-VII.

- The facilities have donated equipment to the local jurisdictions that is used for health and public safety purposes.

- They enhance tourism in the surrounding areas.

V. Other Benefits to the Band From Improved Local Economic Conditions

As the landlord for PFSF, the Band is likely to see other benefits from the improved local conditions. Similar to larger counties hosting larger nuclear facilities, the Band should see these benefits from hosting PFSF, but on a smaller scale. In our research on the impact of nuclear facilities on the surrounding local areas we found that the facilities are economic mainstays of the local communities[31]:

- They provide a number of jobs paying wages and salaries above the average community wage.

- The facilities are responsible for a substantial portion of total employment and personal incomes in the local areas.

In each area, local government officials, civic leaders, and community activists are enthusiastic in their praise of the beneficial effects that the facilities have had on the regions; for example[32]:

- Local officials originally campaigned hard to get Chem-Nuclear to locate in Barnwell, and have never regretted it -- they feel that it is the "best thing that ever happened to the local community."

- In West Feliciana Parish, the local Chambers of Commerce and the Parish Tourist Commission have made the nuclear plant a part of their campaigns to increase economic development and tourism in the area, obviously feeling that the plant is a major attraction for the region.

- In Callaway County, the local Chambers of Commerce has made the nuclear plant a cornerstone of its campaigns to increase economic development and tourism in the area, feeling that the presence of the plant benefits the region.

- In Coffey County, the WCGS is credited with "saving" the local area, stopping and then reversing the economic decline of the County (which has

[31]Ibid.

[32]*Research Appendix To The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapters I-VII.

been the fate of many other rural Kansas counties), and with leading an economic/industrial revival.

In addition to the employees, the facilities also bring another group to the local areas: The spouses of those employed at the facility. In general, the spouses tend to be highly educated, and they add a trained bank of additional talent to the community.[33] Many work in local schools and colleges.

Finally, it is especially noteworthy that local officials and civic and business leaders strongly feel that the facilities and their employees' presence has made an important difference in the community; for example[34]:

- A local minister noted of his congregation: "Their out-of-state background brought new ideas and insights to our church."

- The head of a high school student activity group stated: "These parents have raised the intellectual expectations of the community and brought tangible experience from the outside."

- An elected official stated that "Bringing in highly educated and technical people has greatly enriched the area."

- A local business owner stated that: "Simply put, we'd be out of business without it."

VI. The Potential for Greater Retention of Younger Band Members in the Area Resulting From the Construction and Operation of the PFSF

Based on research, MISI found that one of the most important benefits of the nuclear facilities identified by local residents, government officials, and civic and religious leaders is that they have helped retain younger residents in the area and, at least as important, have allowed residents who have migrated from the area to return. The importance that local people attribute to these benefits can hardly be overemphasized.

The coming of the nuclear facilities helped significantly[35]:

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[33]Terry Marshall, *Carlsbad and the WIPP, A Socioeconomic Impact Study of the Waste Isolation Pilot Plant, Carlsbad, New Mexico*, Riverside Research & Associates, May 1998, p. 8-5.

[34]*Research Appendix To The Impact On The Local Economy And On Property Values Of The Proposed Private Fuel Storage Facility In Skull Valley, Utah,* op. cit., Chapters I-VII.

[35]Ibid.

- The jobs provided by the facilities offered attractive economic opportunities for younger residents who no longer had to leave the area to find meaningful employment.

- The indirect economic benefits, described in Sections IV.B and V, also provided economic opportunities for young people in addition to direct employment in the facilities.

- The marked improvement in the regional schools resulting from the revenues generated by the facilities made the local areas an attractive place to live for persons with young children.

- The infrastructure improvements and firms lured to the areas, made possible by the revenues generated by the facilities, also improved economic and employment opportunities.

Perhaps most important, not only did the development of the facilities make it possible to retain younger residents, but the improved local economies have lured back local people who had left earlier seeking better opportunities. Again, it is difficult to overemphasize how important this is to the local residents, officials, and civic leaders.

There are many ways in which the facilities contribute substantially to youth-oriented activities and make the local areas attractive to younger residents; for example[36]:

- The facilities sponsor and support youth sports.

- The facilities sponsor drug and alcohol awareness programs for local youth, and the facilities' employees volunteer to staff these efforts.

- The facilities fund transportation costs for local special-needs children attending summer camp programs and other events.

- The employees volunteer as coaches, tutors, and event workers.

Local civic leaders are effusive in their praise of the facilities' impact on retaining younger people and attracting local residents who have left; for example[37]:

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[36]Ibid.

[37]Ibid.

- "It has assisted in supporting the local economy, in proving training for local people, in giving opportunity to local people to remain in their hometown, yet build a career."

- "Many residents, especially women, have gotten good-paying jobs with super benefits, which they wouldn't have gotten otherwise."

- "Many graduates are returning home and making a living here. The more competent, responsible, and educated people there are in our city, the better off we will be."

Two relevant examples relate to Carlsbad, New Mexico and Coffey County, Kansas.

- In Carlsbad, prior to WIPP, the Carlsbad Department of Planning concluded that the area lacked a diverse base of employment opportunity for the young (those who did not want to pursue a career in mining or drilling) and, as a result, the region was losing its best and brightest. WIPP changed this and has become a "substantial economic boon" to the region by creating employment opportunities that give younger residents the option of remaining in the region.

- In Coffey County, the development of WCGS drastically improved economic and social conditions in the region and gave Coffey County the means to keep its young people from moving away and to attract back some of its citizens who had migrated in recent years. This is very important to local officials and residents.

Similar effects are likely in Tooele County and on the Band's Reservation, and these effects are especially relevant to the Goshutes. The 40-50 on-site jobs created at the PFSF are significant in relation to the size of the Band, which only numbers about 1-5 on the Reservation, and Goshutes will have first priority for the jobs. This will allow younger tribe members to remain on the Reservation and, at least as important, provide jobs for tribe members who wish to return. Further, to the degree that the revenues from PFSF are used to improve economic and social conditions on the Reservation and in Tooele County, the local area will be more attractive to the Band's younger members and to those Goshutes who have moved away.

RESEARCH APPENDIX TO
THE IMPACT ON THE LOCAL ECONOMY AND ON PROPERTY VALUES OF THE PROPOSED PRIVATE FUEL STORAGE FACILITY IN SKULL VALLEY, UTAH

Prepared for Private Fuel Storage, LLC
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INTRODUCTION

The major purpose of the study *The Impact on the Local Economy and on Property Values of the Proposed Private Fuel Storage Facility in Skull Valley, Utah* was to estimate the likely effects on property values and the local economy of the PFSF. Using available published data on employment, personal income, property values, tourism, and other variables, economic and statistical analyses, literature reviews, and information obtained from interviews, the economic indicators for the study areas were assessed and compared to state and national values. This Appendix provides detail on the case studies, research methodology, and data sources utilized in the research.

Seven nuclear facilities were selected to be studied as part of the assessment:

- The nuclear waste management facility operated by Chem-Nuclear Systems LLC in Barnwell County, South Carolina.
- The Waste Isolation Pilot Plant (WIPP), a transuranic waste disposal facility operated by TRU Solutions LLC, 26 miles east of Carlsbad, New Mexico.
- The Envirocare mixed waste disposal facility in Clive, Utah.
- The South Texas Project (STP) Nuclear Generating Station in Matagorda County, Texas.
- The River Bend Nuclear Generating Station in West Feliciana Parish, Louisiana.
- The Callaway nuclear power plant in Callaway County, Missouri.
- The Wolf Creek Generating Station (WCGS) nuclear power plant in Coffey County, Kansas.

These case studies are discussed in Chapters I through VII. In addition, we examined the economic impacts estimated for a facility similar to the PFSF that has been proposed for Wolf Creek, Wyoming (Chapter VIII), analyzed detailed economic and demographic data for Utah and Tooele County (Chapter IX), and assessed the uses which local jurisdictions make of the revenues generated by large industrial and commercial facilities (Chapter X).

I. BARNWELL COUNTY, SOUTH CAROLINA, AND THE CHEM-NUCLEARWASTE MANAGEMENT FACILITY

I.A. Barnwell County at a Glance

Barnwell County, South Carolina, is located in the southwest portion of the state near the Georgia border, and lies midway (50 miles) between Augusta, Georgia and Columbia, South Carolina. Barnwell is one of 46 counties in South Carolina, and it is not part of a Metropolitan Area. Its 1998 population of 21,821 ranked 37th in the state. The population of its largest city, Barnwell, is 6,000.

In 1998, Barnwell had a per capita personal income (PCPI) of $23,086. This PCPI ranked 9th in the State, was 103 percent of the state average of $22,372, and 85 percent of the national average of $27,203. In 1988, the PCPI of Barnwell was $12,191 and ranked 26th in the state. The average annual growth rate of PCPI in the county over the past 10 years was 6.6 percent; the average annual growth rate of PCPI for the state was 4.8 percent and for the nation was 4.6 percent.

In 1998, Barnwell had a total personal income (TPI) of $504 million, which ranked 32nd in the state and accounted for 0.6 percent of the state total. In 1988, the TPI of Barnwell was $244 million and ranked 37th in the state. The average annual growth rate of TPI in the county over the past 10 years was 7.5 percent, whereas the average annual growth rate for the state was 6.0 percent and for the nation was 5.6 percent.

Total personal income (TPI) includes the earnings (wages and salaries, other labor income, and proprietor's income); dividends, interest, and rent; and transfer payments received by the residents of Barnwell. In 1998, earnings were 70.1 percent of TPI (compared with 69.7 percent in 1988); dividends, interest, and rent were 10.8 percent (compared with 13.6 percent in 1988); and transfer payments were 19.2 percent (compared with 16.7 percent in 1988). From 1988 to 1998, earnings increased, on average, 7.6 percent each year; dividends, interest, and rent increased on average 5.1 percent; and transfer payments increased on average 9.1 percent.

Earnings of persons employed in Barnwell increased from $181 million in 1988 to $423 million in 1998, an average annual growth rate of 8.9 percent. The largest industries in 1998 were services, durable goods manufacturing, 13.3 percent; and state and local government, 9.6 percent. In 1988, the largest industries were services, 22.9 percent of earnings, durable goods manufacturing, 19.0 percent, and nondurable goods manufacturing, 15.8 percent. Of the industries that accounted for at least five percent of earnings in 1998, the slowest growing from 1988 to 1998 was nondurable goods manufacturing (9.2 percent of earnings in 1998), which increased at an average annual rate of 3.1 percent; the fastest was services.

Basic economic and demographic data for Barnwell are summarized in Tables 1 through 3.

Table 1
Demographic Profile of Barnwell County and South Carolina

	Barnwell County	South Carolina
Population, 2000	23,478	4,012,012
Population, percent change, 1990 to 2000	15.7%	15.1%
White persons, percent, 2000 (a)	55.2%	67.2%
Black or African American persons, percent, 2000 (a)	42.6%	29.5%
American Indian and Alaska Native persons, percent, 2000 (a)	0.3%	0.3%
Asian persons, percent, 2000 (a)	0.4%	0.9%
Native Hawaiian and Other Pacific Islander, percent, 2000 (a)	Z	Z
Persons reporting some other race, percent, 2000 (a)	0.8%	1.0%
Persons reporting two or more races, percent, 2000	0.7%	1.0%
Persons under 18 years old, percent, 2000	28.1%	25.2%
Persons of Hispanic or Latino origin, percent, 2000 (b)	1.4%	2.4%
High school graduates, persons 25 years and over, 1990	7,284	1,480,330
College graduates, persons 25 years and over, 1990	1,442	360,833
Homeownership rate, 1990	73.2%	69.8%
Single family homes, number 1990	5,127	932,052
Households, 1990	7,131	1,258,783
Persons per household, 1990	2.81	2.68
Family households, 1990	5,459	935,575
Median household money income, 1997 model-based estimate	$29,085	$33,325
Persons below poverty, percent, 1997 model-based estimate	21.5%	14.9%
Children below poverty, percent, 1997 model-based estimate	30.5%	23.0%

Table 2
Business and Geographic Profiles of Barnwell County and South Carolina

Business Data	Barnwell County	South Carolina
Private nonfarm establishments with paid employees, 1998	403	94,985
Private nonfarm employment, 1998	6,868	1,526,106
Private nonfarm employment, percent change 1990-1998	25.8%	20.5%
Nonemployer establishments, 1997	889	188,081
Manufacturers shipments, 1997 ($1000)	450,313	70,797,020
Retail sales, 1997 ($1000)	116,171	33,634,264
Retail sales per capita, 1997	$5,337	$8,874
Minority-owned firms, 1992	137	21,127
Women-owned firms, 1992	312	64,812
Housing units authorized by building permits, 1999	34	36,161
Federal funds and grants, 1999 ($1000)	118,612	20,833,188
Local government employment – full-time equivalent, 1997	1,057	143,952
Geographic Data	**Barnwell County**	**South Carolina**
Land area, 2000 (square miles)	548	30,110
Persons per square mile, 2000	42.8	133.2
Metropolitan Area	None	

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
1: Includes data not distributed by county.
FN: Footnote on this item for this area in place of data
NA: Not available
D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
Z: Value greater than zero but less than half unit of measure shown

Source: U.S. Census Bureau. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments.

Table 3
Summary Employment Indicators, 1990-2001, for Barnwell County and South Carolina

Barnwell County

	Labor Force	Employment	Unemployment	Unemployment Rate
1990	9,808	8,885	923	9.4
1991	10,123	8,690	1,433	14.2
1992	10,311	9,077	1,234	12.0
1993	10,787	9,328	1,459	13.5
1994	10,943	9,711	1,232	11.3
1995	11,105	9,922	1,183	10.7
1996	11,083	9,882	1,201	10.8
1997	11,266	10,382	884	7.8
1998	11,711	10,944	767	6.5
1999	11,505	10,621	884	7.7
2000	11,178	10,501	678	6.1
2001	11,187	10,511	676	6.0

	South Carolina				U.S.
	Labor Force	Employment	Unemployment	Unemployment	Rates
1990	1,738,624	1,655,894	82,730	4.8	5.6
1991	1,768,528	1,657,104	111,424	6.3	6.8
1992	1,796,363	1,682,743	113,620	6.3	7.5
1993	1,826,513	1,686,920	139,595	7.6	6.9
1994	1,824,090	1,709,446	114,644	6.3	6.1
1995	1,865,211	1,770,523	94,688	5.1	5.6
1996	1,865,007	1,753,247	111,760	6.0	5.4
1997	1,931,339	1,844,062	87,277	4.5	4.9
1998	1,962,922	1,888,237	74,685	3.8	4.5
1999	1,963,273	1,875,433	87,840	4.5	4.2
2000	1,985,249	1,908,745	76,504	3.9	4.0
2001	1,994,316	1,915,806	78,511	3.9	4.6

Source: U.S. Department of Labor, Bureau of Labor Statistics, and Management Information Services, Inc., 2001.

I.B. The Barnwell Nuclear Waste Disposal Facility

Barnwell is the site of a commercial low-level radioactive waste disposal facility operated by Chem-Nuclear Systems L.L.C., a wholly-owned subsidiary of GTS Duratek, Inc. located on 235 acres in Barnwell County. On July 1, 2000, South Carolina joined the Northeast Compact, thereby forming the Atlantic Compact with Connecticut, New Jersey, and South Carolina as member states. The South Carolina Budget and Control Board establishes and adjusts the rate schedules for disposal of radioactive waste at the Barnwell facility, and disposal rates for waste generated within the Atlantic Compact cannot exceed disposal rates available to waste generators outside the compact. The South Carolina Public Service Commission approves the allowable costs for disposal operations.

In the late 1960s and early 1970s the South Carolina State Development Board and other state agencies promoted and encouraged the development and location of nuclear energy facilities within the state. Barnwell County officials were active in these efforts and encouraged Chem-Nuclear to locate the waste management facility near Barnwell, and the facility commenced operations in 1971.

Chem-Nuclear's Barnwell site is the only low-level radioactive waste management facility in the country that has operated continuously since start-up without interruption. Chem-Nuclear has trained thousands of customers, regulators, and members of the public on packaging and transporting low-level radioactive waste to meet state and Federal regulations.

Of the 235 acres deeded to the state of South Carolina and leased to Chem-Nuclear for disposal operations as required by federal law, approximately 103 acres have been used for disposal of low-level waste. About 27.5 million cubic feet of low-level radioactive waste have been buried at the site since 1971, and 160,000 cubic feet will be processed during 2001. Since radioactivity decays with time, much of the waste has already decayed to background levels.

I.C. Economic Benefits to the Local Community of Chem-Nuclear's Barnwell Site

The Barnwell facility is a mainstay of the local economy and school district:

- Chem-Nuclear directly employs 300 highly-skilled, well-paid workers in the area (including 75 in the waste disposal operations) and creates a total of more than 600 jobs in the Barnwell region -- about eight percent of employment in the county.

- Chem-Nuclear and its parent company, GTS Duratek, Inc., purchase $12 million per year in goods and services within Barnwell county and South Carolina, and have a payroll of more than $9.2 million.

- Every year, Chem-Nuclear pays $44 million in taxes and fees to the local and state governments; the property taxes it pays are the mainstay of the Barnwell local government and educational system.

- Chem-Nuclear pays approximately $600;000 per year in Barnwell County taxes through vehicle taxes, real estate taxes, and business license taxes. In addition, Barnwell county receives $2 million per year from revenues earned on waste received at the disposal site.

- Just over the past five years alone, Chem-Nuclear has generated over $200 million in earmarked funds for local school districts in South Carolina -- including Barnwell.

Thus, Chem-Nuclear has a large, beneficial financial impact on Barnwell County and South Carolina.

Since the beginning of commercial operation of Chem-Nuclear's facility, Barnwell County's economy has been generally robust:

- Since 1970 the county's population has increased 30 percent, and is still growing.

- Between 1990 and 2001, employment increased nearly 20 percent.

- Personal income in the county increased more than eight-fold over the past 30 years.

- Since 1970, per capita income (PCI) in Barnwell County has increased five-fold, rising faster than the national average and the state average.In 1988, Barnwell County's per capita income ranked 26th in the state, but by 1998 it had risen to ninth in the state.

- Barnwell has become wealthier relative to the nation and also to the state.

The Chem-Nuclear facility has played an important role in Barnwell County's economic development: It has allowed the surrounding jurisdictions to increase their levels of service and the quality of their educational systems, it has allowed the County to establish a revolving loan fund that is used to finance economic development, and it has attracted other industries to the area. For example, a laundry facility has been established to service the Chem-Nuclear facility and an industrial park is being developed next to Chem-Nuclear -- the European firm Cronotex is investing $160 million in the park to construct a wood laminate plant. In addition, local government officials credit the Chem-Nuclear facility with assisting in the local area's economic development.[1]

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[1]Based on discussions with officials from the County Tax Assessors Office, the County Department of Economic Development, and the Barnwell Chamber of Commerce, April 2001.

The Barnwell facility has, over the past 30 years, exerted a strong, positive effect on the local real estate market and on home values:

- Since the Barnwell facility began operating in the 1971, housing values in the surrounding area have increased, on average, three percent to five percent per year, and commercial real estate has also appreciated significantly.

- New houses in subdivisions in the proximity of the Barnwell facility originally sold for $30,000 in the early 1970s. By the early 1990s, these homes were selling for $65,000 - $70,000, and, at present, are selling for between $100,000 and $150,000.

- One half mile from the Barnwell facility a new development was begun in the early 1990s with new homes constructed on 3 to 5 acre lots. This development, one of the more popular and desirable ones in the area, had homes selling for $100,000 - $200,000 at that time. At present, these home are selling for $350,000 to $400,000.

- The average price of homes in the proximity of the Chem-Nuclear facility tend to be higher than the average price of homes in Barnwell county.

Local government officials and real estate agents verify that the Chem-Nuclear facility has had a positive effect on the local housing market, that it has not been a deterrent to new home buyers, and that the incomes from the jobs created support the housing market.[2]

Chem-Nuclear has always been actively involved in the local community; for example:

- Employees of Chem-Nuclear have been board members of organizations such as the Barnwell County Chamber of Commerce, Tri-County Alliance Economic Development Board, the Barnwell County United Way, the Barnwell County Rotary Club, the Barnwell County Chapter of the American Cancer Society, and the Tri-County Workforce Readiness Partnership.

- Chem-Nuclear donated a tract of land to the Town of Snelling for its fire main pump, and donated five fire hydrants to Snelling. The Snelling Volunteer Fire Department and the Chem-Nuclear Fire Brigade work together, and

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[2]Based on discussions with local real estate agents and with officials from the County Tax Assessor's Office and from the Barnwell Chamber of Commerce, April 2001.

Chem-Nuclear's fire truck is available to Snelling if needed. Chem-Nuclear has trained firefighters who are always ready to assist in any fire emergency.

- In 1983, Chem-Nuclear agreed to protect a Carolina Bay (Craig Pond) through the SC Heritage Trust Program. Through the years, Chem-Nuclear recognized that the unique characteristics of this wetlands area should be permanently protected. On January 19, 1995, Chem-Nuclear granted a Conservation Easement on 267 acres where there are two Carolina Bays -- Craig Pond and Long Pond.

- Since 1992, Chem-Nuclear has assisted the SC Waterfowl Association (SCWA) and SC Wildlife and Marine Resources Department with tours of Craig Pond for groups including students, garden clubs, civic organizations, and others. The SCWA is tracking wood duck nest productivity in Craig Pond, and a platform next to one of the wood duck boxes allows visitors to see ducks, eggs, and/or abandoned boxes.

- Chem-Nuclear was a major contributor to the Barnwell County Historical Committee's Courtyard Project, which was completed in 1999.

- Chem-Nuclear is a corporate sponsor of the Barnwell County Arts Council.

- Chem-Nuclear is a sponsor of the Annual Hooked on Fishing -- Not On Drugs Fishing Rodeo held in conjunction with the SC Wildlife Department and the Barnwell County Chamber of Commerce. Chem-Nuclear employees volunteer to assist at this event that combines fishing and drug awareness programs for youth in the county.

- Chem-Nuclear funds transportation costs for Barnwell County special-needs children attending a summer camp program coordinated by the Barnwell County Health Department.

- Chem-Nuclear supports the Barnwell Recreation Department by sponsoring local baseball and soccer teams.

- Chem-Nuclear volunteers host parties for the residents of the Barnwell County Nursing Home at Halloween and Christmas.

- Chem-Nuclear supports the American Cancer Society by sponsoring a team in the annual Walk for Life.

- Chem-Nuclear employees participate in fund raising for the Muscular Dystrophy Association.

- Chem-Nuclear employees participate in the United Way Campaign in Barnwell and in Columbia, SC. The company also donates funds to the local United Way campaigns.

- Chem-Nuclear supports the Barnwell County Disaster Preparedness Agency through training programs and participation in drills.

- Chem-Nuclear supports the American Red Cross by having blood drives at the Barnwell Disposal Facility and at the corporate offices in Columbia, SC.

Here is a sample of what Barnwell County officials and civic and business leaders have had to say about the facility:

- "Chem-Nuclear is very supportive of the community. The company is community oriented, and keeps the community well informed of what they are doing. The facility has not been a deterrent to tourists and has had no negative impact. Tourism has also grown in the last ten years. Real estate has been booming as well." -- Ms. Cathy Lynn, Barnwell Chamber of Commerce.[3]

- "Chem-Nuclear has been a major contributor to the County and all the managers are very informative. If there are hearings against the facility, local citizens will go out of their way to defend the facility and keep it in the county. They do not want other states to find out the benefits of having the facility in the community, because they are afraid other states my try and take the facility away from Barnwell. – Mr. Marshal Martin, Barnwell Office of Economic Development.[4]

- "The people of Barnwell County were glad for Chem-Nuclear to locate here, and nothing since then has changed our minds. In fact, we're more convinced than ever that they are a superb company and good neighbor." -- Mr. Danny Black, past Barnwell County Council Chairman.[5]

- "We want Chem-Nuclear in Barnwell County. They have been here for more than 15 years and have never given us any reason to want them to leave.

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[3]Quoted in discussion, April 2001.

[4]Quoted in discussion, April 2001.

[5]MISI, *Economic Benefits of Nuclear Facilities to the Surrounding Areas.*, p. 16.

Their employees are active in the community, and we certainly don't want to lose them." -- Ms. Kay Still, Barnwell County civic leader.[6]

- "The Barnwell facility is the best thing that ever happened here, and if it ever went away the town would be in real serious trouble." -- Mr. Danny Creech, the local tax assessor for more than 20 years and a life-long Barnwell resident.[7]

[6]Ibid.

[7]Ibid.

II. EDDY COUNTY, NEW MEXICO, AND THE WASTE ISOLATION PILOT PLANT

II.A. Eddy County at a Glance

Eddy County, New Mexico lies in the southeast corner of New Mexico, 250 miles southeast of Santa Fe and Albuquerque and is not part of a Metropolitan Area. Its 1998 population of 53,446 ranked 11th most populous of the state's 33 counties, and its largest city, Carlsbad, has a population of 27,000.

In 1998, Eddy County's per capita personal income of $19,546 ranked seventh in the state, and was 92 percent of the state average of $21,164 and 72 percent of the national average of $27,203. In 1988, the PCPI of the county was $12,239 and ranked 11th in the state. The average annual growth rate of the county's PCPI over the past 10 years was 4.8 percent, compared to 4.7 percent for the state and 4.6 percent for the nation.

In 1998, Eddy had a total personal income of $1,044 million, ninth in the state, which accounted for 2.8 percent of the state total. In 1988, the TPI of the county was $598 million and ranked 9th in the State. The average annual growth rate of TPI over the past 10 years was 5.7 percent, compared to 6.3 percent for the state and 5.6 percent for the U.S..

Total personal income includes the earnings (wages and salaries, other labor income, and proprietor's income); dividends, interest, and rent; and transfer payments received by the residents of Eddy County. In 1998, earnings were 62.8 percent of TPI (compared with 61.4 percent in 1988); dividends, interest, and rent were 17.9 percent (compared with 21.6 percent in 1988); and transfer payments were 19.4 percent (compared with 17.0 percent in 1988). From 1988 to 1998, earnings increased, on average, 5.9 percent annually; dividends, interest, and rent increased, on average 3.7, percent per year; and transfer payments increased, on average 7.1 percent, per year.

Earnings of persons employed in Eddy County increased from $388 million in 1988 to $697 million in 1998, an average annual growth rate of 6.0 percent. The largest industries in 1998 were mining, 21.2 percent of earnings; services, 18.4 percent; and state and local government, 12.2 percent. In 1988, the largest industries were mining, 24.0 percent of earnings; services, 19.8 percent; and state and local government, 11.7 percent. Of the industries that accounted for at least five percent of earnings in 1998, the slowest growing from 1988 to 1998 was mining, which increased at an average annual rate of 4.7 percent; the fastest was transportation and public utilities which increased at an average annual rate of 9.9 percent.

Basic economic and demographic data for Eddy County are summarized in Tables 4 through 6.

Table 4
Demographic Profile of Eddy County and New Mexico

	Eddy County	New Mexico
Population, 2000	51,658	1,819,046
Population, percent change, 1990 to 2000	6.3%	20.1%
White persons, percent, 2000 (a)	76.3%	66.8%
Black or African American persons, percent, 2000 (a)	1.6%	1.9%
American Indian and Alaska Native persons, percent, 2000 (a)	1.3%	9.5%
Asian persons, percent, 2000 (a)	0.4%	1.1%
Native Hawaiian and Other Pacific Islander, percent, 2000 (a)	0.1%	0.1%
Persons reporting some other race, percent, 2000 (a)	17.7%	17.0%
Persons reporting two or more races, percent, 2000	2.6%	3.6%
Persons under 18 years old, percent, 2000	28.9%	28.0%
Persons of Hispanic or Latino origin, percent, 2000 (b)	38.8%	42.1%
High school graduates, persons 25 years and over, 1990	20,330	692,616
College graduates, persons 25 years and over, 1990	3,286	188,336
Homeownership rate, 1990	72.9%	67.4%
Single family homes, number 1990	15,193	416,182
Households, 1990	17,447	543,825
Persons per household, 1990	2.75	2.73
Family households, 1990	13,336	394,958
Median household money income, 1997 model-based estimate	$31,228	$30,836
Persons below poverty, percent, 1997 model-based estimate	18.6%	19.3%
Children below poverty, percent, 1997 model-based estimate	25.3%	27.5%

Table 5
Business and Geographic Profiles of Eddy County and New Mexico

Business Data	Eddy County	New Mexico
Private nonfarm establishments with paid employees, 1998	1,283	42,608
Private nonfarm employment, 1998	15,947	540,186
Private nonfarm employment, percent change 1990-1998	18.3%	29.2%
Nonemployer establishments, 1997	2,228	96,964
Manufacturers shipments, 1997 ($1000)	641,423	17,906,091
Retail sales, 1997 ($1000)	372,716	14,984,454
Retail sales per capita, 1997	$7,014	$8,697
Minority-owned firms, 1992	404	26,729
Women-owned firms, 1992	923	40,636
Housing units authorized by building permits, 1999	58	9,716
Federal funds and grants, 1999 ($1000)	344,038	13,580,214
Local government employment – full-time equivalent, 1997	2,500	69,941

Geographic Data	Eddy County	New Mexico
Land area, 2000 (square miles)	4,182	121,356
Persons per square mile, 2000	12.4	15.0
Metropolitan Area	None	

(c) Includes persons reporting only one race.
(d) Hispanics may be of any race, so also are included in applicable race categories.
1: Includes data not distributed by county.
FN: Footnote on this item for this area in place of data
NA: Not available
D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
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Source: U.S. Census Bureau. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments.

Table 6
Summary Employment Indicators, 1990-2001, for Eddy County and New Mexico

		Eddy County			
	Labor Force	Employment	Unemployment	Unemployment Rate	
1990	30,191	27,971	2,220	7.4	
1991	30,371	28,022	2,349	7.7	
1992	30,954	28,653	2,301	7.4	
1993	31,246	28,710	2,536	8.1	
1994	31,620	29,043	2,577	8.1	
1995	32,238	29,629	2,609	8.1	
1996	32,919	29,655	3,264	9.9	
1997	33,504	30,805	2,699	8.1	
1998	34,483	31,678	2,805	8.1	
1999	34,427	31,959	2,468	7.2	
2000	36,020	33,475	2,545	7.1	
2001	36,760	33,855	2,906	7.9	
		New Mexico			U.S.
	Labor Force	Employment	Unemployment	Unemployment Rate	Unemployment Rate
1990	707,555	661,540	46,013	6.5	5.6
1991	725,914	674,094	51,818	7.1	6.8
1992	740,911	688,763	52,148	7.0	7.5
1993	756,062	697,828	58,234	7.7	6.9
1994	778,134	729,322	48,812	6.3	6.1
1995	791,034	741,426	49,608	6.3	5.6
1996	797,917	733,625	64,292	8.1	5.4
1997	814,114	763,254	50,860	6.2	4.9
1998	831,052	779,701	51,351	6.2	4.5
1999	809,094	763,609	45,485	5.6	4.2
2000	832,835	792,435	40,400	4.9	4.0
2001	841,329	795,667	45,662	5.4	4.6

Source: U.S. Department of Labor, Bureau of Labor Statistics, and Management Information Services, Inc., 2001.

II.B The WIPP Facility

The Waste Isolation Pilot Plant (WIPP) is a transuranic waste disposal facility 26 miles east of Carlsbad, and is the world's first deep geologic repository for long-lived radioactive wastes. The WIPP facility:

- Is a single level repository exclusively for U.S. defense-related transuranic waste and is designed to dispose of this waste in ancient salt beds 2,150 feet below the surface of the ground.

- Is comprised of above-ground buildings and a huge underground repository, and is capable of disposing of 6.2 million cubic feet of waste.

- Commenced construction in 1981, completed construction and began operations in 1988, received its first shipment of waste in March 1999, and has an expected life of 35 years.

- Is managed by the Department of Energy and operated by TRU Solutions LLC.

- Directly employs about 800 people.

II.C. Economic Benefits to the Local Community of WIPP

WIPP has had substantial positive impacts on the local economy and real estate market:

- Each year, WIPP spends $18 million on goods and services in New Mexico, about $10 million of which is spent in the Carlsbad area, and provides significant economic stimulus to the region.

- WIPP-related economic develop initiatives in the local area totaled more than $4.2 million over the past five years and helped create several commercial and industrial facilities, including the Advanced Manufacturing and Innovation Training Center and the Southeast New Mexico National Environmental Technology and Training Center.

- In 2000, WIPP spent $2.5 million on community outreach programs in Southeast New Mexico, including $2 million to build a facility that created 200 private sector jobs.

- The wages and salaries paid at WIPP are more than twice the local average.

- The facility creates five percent of local area jobs, but 12 percent of its salaries and wages.

- Thanks to WIPP, since the late 1990s the Carlsbad economy has become more diverse, stronger, and vibrant than it has been in years, and WIPP has played an important role in this economic revival: Community leaders credit WIPP with revitalizing the local economy, the facility has become a key agent of local economic development, and the improvements in transportation infrastructure made as a part of WIPP have opened up all of southeast New Mexico to increased commerce and are having major economic impacts on the region's economy.[10]

- Since WIPP began operations, the population of Carlsbad has increased from 25,000 to 27,000 and the population of Eddy County has increased from 47,000 to 53,000, and WIPP is responsible for a least a portion of this population growth.[11]

- Over the past 12 years, per capita personal income in Eddy County has increased more rapidly than the state or national averages and the county has become wealthier relative to the state and the nation. Since WIPP contributes five percent of the local area's wages, but 12 percent of the salaries and wages, these much-higher-than-average wages and salaries have helped to increase the average per capita income in Carlsbad.[12]

- WIPP, and the jobs it created, helped the Carlsbad region overcome the closing of local potash mines.[13]

- WIPP attracts large numbers of scientists, engineers, technicians, government officials, and researchers from across the U.S. and around the world to visit and study this high-tech, state-of-the-art facility.

- The facility hosts numerous scientific and technical meetings and conferences based on its unique technology and mission.

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[10]Research has shown this resurgence of the Carlsbad economy to be , to a significant degree, the result of the economic activity generated by WIPP; see Terry Marshall, *Carlsbad and the WIPP, A Socioeconomic Impact Study of the Waste Isolation Pilot Plant, Carlsbad, New Mexico, p. 2-20.*

[11]See the discussion in Marshall, op. cit., pp. ii – xii.

[12]See Marshall, op. cit., p. v.

[13]Based on discussions with Carlsbad real estate agents, April 2001.

The facility has had a substantial, positive impact on the local real estate market[14]:

- WIPP has helped reinvigorate the housing market, new home construction is booming in Carlsbad, and WIPP has been identified as the major factor responsible for the current boom.[15]

- The new homes built in Carlsbad over the past several years are larger and more expensive than the general housing stock in town, and WIPP employees' requirements for quality housing are responsible for a substantial portion of these new homes.[16]

- WIPP has made and continues to make a significant impact on the sales and construction of up-scale housing. New construction is designed to meet the housing needs of management and professional level persons associated with the project.[17]

WIPP directly provides substantial support to local schools, and it:

- Employs a full-time educational outreach specialist to talk to students and educators about WIPP, careers, science, and math.

- Assists regional educational institutions in writing grant proposals and teaches educators how to apply for grants.

- Provides support to schools and educational consortia for web site development.

- Supports math and science nights at local schools.

- Donates excess equipment, such as computers, to schools and educational consortia.
- Supports numerous school programs, such as the Renaissance program.

- Conducts a summer intern program for high-potential undergraduate students.

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[14]The significant impact of WIPP on the local real estate market is documented in Marshall, op. cit., Chapter 4, and in discussions conducted in April 2001 with the Director of the Eddy County Board of Assessors and with local real estate agents.

[15]See Marshall, op.cit., p. vi.

[16]Ibid., pp. vi – vii.

[17]Based on discussions with Carlsbad real estate agents, April 2001.

- Sponsors work-study students at the secondary level.

The facility and its employees have had a positive impact on the social and cultural fabric of Carlsbad:

- WIPP employees serve as volunteers for nearly every community organization in Carlsbad, including the United Way, Habitat for Humanity, Rotary, Lions, Main Street, the Elks, American Cancer Society, various arts groups, fire departments, and educational and education-related groups.

- Overwhelmingly, Carlsbad residents say that the facility has been positive for the community, both generally and in providing employment, helping business, and in intangible attitudes about the community.

- Prior to WIPP, the Carlsbad Department of Planning concluded that the area lacked a diverse base of employment opportunity for the young (those who did not want to pursue a career in mining or drilling) and, as a result, the region was losing its best and brightest.

- WIPP changed this and has become a "substantial economic boon" to the region by creating employment opportunities that give younger residents the option of remaining in the region. The 800 jobs at the WIPP facility run the gamut and include many scientific, engineering, and professional positions, senior and mid-level management positions, and a wide variety of administrative, clerical, technical, maintenance, and support positions. These positions offer many, varied opportunities for local residents, a number of whom have already risen through the ranks at the facility into middle management and highly compensated technical positions. In addition, and of special importance to the local community, former Carlsbad residents (who had left the area to seek employment opportunities elsewhere) are returning to Carlsbad to take advantage of the opportunities now offered by WIPP.[18]

WIPP, while only open for two years, has already become a significant tourist attraction:

- Site visits and half-day facility tours are offered on a regular basis.

- Demand for these visits and tours is so great that they now must be scheduled two months in advance.

[18]See the discussion in Marshall, op. cit., Chapter 7.

- Approximately 3,000 people tour the site each year, and most of these visitors are from out-of-town and spend at least one night in local hotels and motels.

III. TOOELE COUNTY, UTAH AND THE ENVIROCARE MIXED WASTE FACILITY

III.A. Tooele County at a Glance.

Tooele County lies 30 miles west of Salt Lake City and has a population of 36,000 -- see Chapter IX for a detailed economic and demographic profile of the county.

III.B. The Envirocare Facility

Envirocare of Utah, Inc. operates a low-level radioactive waste and mixed waste disposal facility in Clive, Utah (Tooele County). The facility:

- Is capable of accepting wastes that contain both radioactive and hazardous contaminants, and houses several integral processing units and waste holding receptacles.

- Is located in the Tooele Hazardous Industry District, a 100 square mile area zoned by Tooele County for such industry. Comprehensive governmental safeguards afford environmental protection, and future land use restrictions on the Envirocare property prevent any intrusion into closed disposal areas.[19]

- Commenced operations in 1988 as a disposal facility for radioactive waste, expanded operations in 1990 to include disposal of "mixed" wastes that contain both radioactive and hazardous contaminants, and further expanded operations in 1993 and 1995.[20]

- Is regulated by numerous federal, state, and county agencies, including the U.S. Environmental Protection Agency, the Nuclear Regulatory Commission, the Occupational Health and Safety Administration, the Utah Division of Radiation Control, the Utah Division of Solid and Hazardous Waste, and the Tooele County Departments of Health and Engineering.[21]

- Is permitted to treat 150 tons of material per day, receives up to 50 shipments by truck and/or rail on a daily basis, and disposes of, on average, 12,320,000 cubic feet of material annually.[22]

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[19]Envirocare of Utah, Inc., *The Safe Alternative for Radioactive/Mixed Waste Treatment and Disposal*, 2001, p. 1.
[20]"A Brief History of Envirocare of Utah, Inc."
[21]Envirocare of Utah, Inc., *The Safe Alternative for Radioactive/Mixed Waste Treatment and Disposal, op.cit.* p. 2.
[22]Ibid., pp. 4-7.

- Is licensed to treat and dispose of over 300 characteristic and listed mixed wastes in a variety of physical forms, including soil, concrete, sludge, and building debris.[23]

- Disposes of waste material in above-ground, engineered disposal cells regulated by Utah as an NRC Agreement State and that meet U.S. Department of Energy and U.S. Environmental Protection Agency specifications.

- Is planning the addition of several new technologies targeting "difficult-to treat" organic and mercury wastes.

- Pioneered the safe and permanent disposal of mixed waste, is the nation's leading company in the field, and has an exemplary compliance history that has allowed it to continually expand operations.

- Employs 400 workers on site and has gross revenues of approximately $100 million per year.[24]

II.C. Economic Benefits to the Local Community of the Envirocare Facility

The Envirocare facility has had a favorable economic impact on the local area:

- It generates a payroll of over $1.5 million annually.[25]

- In addition to the taxes it pays, the facility pays five percent of its gross revenues each year to Tooele County -- nearly $5 million annually.[26]

- This represents a substantial portion of the county's budget -- in 1999, county expenditures for general government functions totaled $5.5 million and for public safety totaled $5.8 million.[27]

- It is the tenth largest employer in the county.[28]

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[23]Envirocare of Utah, Inc., "Mixed Waste Treatment Facility: MICRO-LOC Treatment System." 2001.
[24]Based on discussions with Envirocare officials, April 2001.
[25]Ibid.
[26]Ibid.
[27]Tooele County, *Financial Statements, Independent Auditors' Report and Supplemental Information*, December 31, 1999.
[28]Mark S. Knold, *Tooele County Demographic and Economic Profile.* Utah Department of Workforce Services, March 2000, p.31.

- The facility generates, directly and indirectly, about 900 jobs in the local area, which represents about eight percent of the jobs in Tooele County.[29]

- It is continually expanding operations, and the jobs the facility has created since 1988 have helped Tooele county compensate for the loss of 3,300 defense-related jobs over the past decade.[30]

- It has assisted Tooele County in expanding and diversifying its economic base over the past decade.[31]

- It contributed to the construction boom and record construction of new homes in Tooele County in recent years. Local officials feel that the Envirocare facility has been responsible for at least a portion of this activity because the facility has given the county another source of income other than defense-related spending (which accounted for 85 percent of county income) at a time when defense spending in Tooele County has been declining.[32]

- The facility enjoys strong community support and its employees are active in local civic, cultural, charitable, and educational organizations.

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[29]There are about 11,100 jobs in Tooele County; see Utah Department of Workforce Services. *Labor Force*, 2000.
[30]Based on discussion with the Executive Director of the Tooele County Chamber of Commerce, May 2001.
[31]Mark S. Knold, *Tooele County Demographic and Economic Profile,* op.cit., p. 23.
[32] Based on discussion with the Executive Director of the Tooele County Chamber of Commerce, May 2001.

IV. MATAGORDA COUNTY, TEXAS, AND THE SOUTH TEXAS PROJECT NUCLEAR GENERATING STATION

IV.A. Matagorda County at a Glance

Matagorda County is located 70 miles southwest of Houston on the Gulf Coast. The county has a population of 40,000, and its largest city, Bay City, has a population of 20,000.

IV.B. The South Texas Project Nuclear Generating Station

The South Texas Project (STP) is located in Matagorda County 90 miles southwest of Houston, between Bay City and Palacios:

- The Project consists of two 1,250 megawatt Westinghouse pressurized water reactors, and is owned 16 percent by Austin Energy, 25.2 percent by Central Power & Light, 28 percent by City Public Service of San Antonio, and 30.8 percent by Reliant Energy.

- Construction on the Project began in 1975, and Unit 1 went into service in August 1988 and Unit 2 in June 1989.

- Construction costs for STP totaled $5.4 billion.

- The Project is Texas' first nuclear power plant, is the largest electric generating station in Texas, and is among the largest generating stations in the country.

- The site covers 12,200 acres, including a 7,000 acre cooling water reservoir -- the largest above ground reservoir in the world.

- The Project provides enough electricity to serve 500,000 homes -- enough electricity to power a city the size of San Antonio.

- Every year, the Project's two units produce the energy equivalent of 25 million barrels of oil or 8.4 million tons of coal.

IV.C. Economic Benefits to the Local Area of the South Texas Project

The Project generates substantial economic benefits for the surrounding area[33]:

- STP employs about 1,500 persons on a full time basis and, in total, there are over 2,000 employees on the site, including contract labor.
- The Project is the largest employer and the largest taxpayer in Matagorda County.
- Thirty percent of all persons employed in the county owe their jobs, directly or indirectly, to STP.

The revenues generated by the Project provide significant portions of the county's and the local school district's budgets, and project taxes, assessments, and fees provide 70-90 percent of the county and school district budgets. The South Texas Project has exerted a strong, positive effect on the local real estate market and home values, and since 1970, housing values in the surrounding area have increased more than six-fold. Average 2,000 sq. ft. homes in Bay City are currently selling for $100,000+ and have been increasing in value steadily for the past decade, and the salaries and wages derived from STP have been an important factor in maintaining and increasing the value of the area's housing stock.[34]

Comparison of the period since the Project began commercial operation with that prior to the beginning of construction (early 1970s) indicates that the plant has had a substantial economic benefit to the county: The county's population increased by nearly 50 percent, employment increased more than 70 percent, personal income increased eight-fold, per capita income has increased six-fold, and Matagorda County has become wealthier relative to the nation and to the state, and this economic performance was widely shared throughout the county economy. The South Texas Project has been a driving factor in this economic growth.[35]

In addition, Matagorda County lacks major tourist attractions, and the STP Frank T. Harrison, Jr. Visitor Center has itself become a major focal point of tourism. The South Texas Project is featured as a major selling point and tourist attraction for the area in the publications issued by the Matagorda and Bay City Chambers of Commerce.

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[33]These estimates were derived on the basis of information in Management Information Services, Inc., *Economic Benefits of Nuclear Facilities to the Surrounding Areas*, and discussions in April and May 2001 with staff from STP, officials from Matagorda County and Bay City, officials from the Bay City Chamber of Commerce and Agriculture and the Bay City Conventional and Visitors Bureau, and local real estate agents.

[34]Based on discussions in April and May 2001 with the President of the Bay City Chamber of Commerce and Agriculture and with local real estate agents.

[35]Based on discussions in April and May 2001 with staff from STP, officials from Matagorda County and Bay City, officials from the Bay City Chamber of Commerce and Agriculture and the Bay City Conventional and Visitors Bureau, and local real estate agents.

STP is very active in the local community and participates in local fundraising marathons. Its employees are also active locally, and three are currently running for City Council.

V. WEST FELICIANA, PARISH, LOUISIANA, AND THE RIVER BEND STATION

V.A. West Feliciana Parish at a Glance

West Feliciana Parish is located in central Louisiana on the Mississippi border, 100 miles north of New Orleans, 30 miles north of Baton Rouge, and 50 miles south of Natchez. The parish population is 15,000, and its largest city, St. Francisville, has a population of 2,000.

V.B. The River Bend Station

The River Bend Station (RBS) is a nuclear electric power plant located in West Feliciana Parish, just south of St. Francisville on the Mississippi river:

- The plant is owned by Entergy and has an electric generating capacity of 940 Megawatts.
- The plant utilizes a General Electric boiling water reactor and the facility occupies 3,400 acres.
- The plant serves 1,000,000 retail customers.
- Construction began in 1977 and was completed in 1986.
- Every day the Station produces the energy equivalent of about 100 train carloads of coal.

V.C. Economic Benefits to the Local Area of the River Bend Station[36]

- With 800 employees, the River Bend Station is West Feliciana's second largest private employer.
- The Station is a mainstay of the local economy, employing directly 15 percent of the parish private workforce and indirectly creating jobs for another 12 percent.
- The plant's annual payroll comprises 20 percent of the parish total annual wages.

[36]These estimates were derived on the basis of information in *Economic Benefits of Nuclear Facilities to the Surrounding Areas*, op. cit., and discussions in April and May 2001 with staff from Entergy and RBS, officials from West Feliciana Parish and St. Francisville, officials from the West Feliciana Parish Tourist Commission and the Greater St. Francisville Chamber of Commerce, and local real estate agents.

Comparing the period since RBS began operating with that prior to beginning of construction (early 1970s) indicates that the plant has provided substantial economic benefits to the parish: The parish population was 20 percent higher in 1999 than in 1970, employment increased 80 percent, personal income increased seven-fold, per capita income increased five-fold, and the parish has become wealthier relative to the nation and the state. This economic performance was widely shared throughout the parish economy.

The taxes generated by the plant provide significant revenues for the parish and school district budgets:

- Since it began commercial operation, RBS has paid over $70 million in special sales tax assessments to the West Feliciana School Board, and this revenue has had significant impact: Both teachers and students have consistently ranked higher than state levels for attendance, the number of teachers certified to teach in the subjects they teach, the number of graduate degree teachers, and teacher evaluation scores.

- West Feliciana Parish teachers are among the highest paid in the state, and a high percentage of them hold advanced degrees.

RBS has exerted a strong, positive effect on the local real estate market and home values, and since 1970 housing values in the surrounding area have increased more than five-fold.

The River Bend Station has had a positive impact on tourism in the parish: The plant constructed a major tourist facility -- the River Bend Energy Center -- located at the plant entrance. The Energy Center is highly regarded and is listed as a major tourist attraction in the standard literature, brochures, and "lists of suggested activities" furnished by the West Feliciana Parish Tourist Commission.

Perhaps the most telling facet of the relationship between West Feliciana Parish and the River Bend Station is that the Parish was willing to forego ten years of property tax payments (1986-1996) in the range of $50 million per year to have the plant located within its boundaries. In the early 1970s, prior to initiation of plant development, West Feliciana Parish was the second poorest in Louisiana, a state that is one of the poorest in the nation, and the Parish viewed RBS as an economic Godsend.[37]

[37]Based on discussions in April and May 2001 with officials from West Feliciana Parish and St. Francisville, officials from the West Feliciana Parish Tourist Commission and the Greater St. Francisville Chamber of Commerce, and local real estate agents.

VI. CALLAWAY COUNTY, MISSOURI, AND THE CALLAWAY NUCLEAR POWER PLANT

VI.A. Callaway County at a Glance

Callaway County is located 120 miles west of St. Louis and 25 miles northeast of the State Capital, Jefferson City. The County has a population of 36,000, and its largest city, Fulton, has a population of 11,000.

VI.B. The Callaway Nuclear Power Plant

The Callaway Nuclear Power Plant is located in Callaway County, Missouri, ten miles southeast of Fulton:

- The plant is a pressurized water reactor using a Westinghouse nuclear steam supply system, and is owned by the AmerenUE company.
- Construction on the plant began in 1975 and it went into service in 1984.
- The Callaway plant produces 1,150 Megawatts of electricity and cost $3 billion to build.
- AmerenUE owns 7,200 acres of land at the site, 6,800 of which are administered by the Missouri Department of Conservation and Wildlife Management.
- The plant provides electricity to 750,000 persons and is the largest generating station in the AmerenUE system.

VI.C. Economic Benefits to the Local Area of the Callaway Plant[38]

- With 750 employees, the Callaway Plant is Callaway County's largest private employer.
- About 15 percent of all persons employed in the county owe their jobs to the Callaway Plant, and WCGS-related income makes up more than 15 percent of the total county personal income.

[38]These estimates were derived on the basis of information in *Economic Benefits of Nuclear Facilities to the Surrounding Areas*, op. cit., and discussions in April and May 2001 with staff from AmerenUE and the Callaway Nuclear Power Plant, officials from Callaway County and Fulton, officials from the Callaway Chamber of Commerce, and local real estate agents.

The taxes generated by the plant provide significant portions of the county's and the school district's budgets:

- The Callaway plant pays $6 million per year in property taxes to the county, $3.5 million of which are allocated to the School District.

- Plant taxes, assessments, and fees provide over half of the Callaway County budget.

The Callaway plant has exerted a strong positive effect on the local real estate market and home values, and since 1970, housing values in the surrounding area have increased more than five-fold. The plant has also had a beneficial effect on the local area economy: Since 1970, the county's population has increased by more than one-third, employment nearly doubled, and personal income and per capita income increased more than seven-fold. Callaway County has become wealthier relative to the nation and also to the state, and the exceptional economic performance was widely shared by all sectors of the county economy.

The Callaway plant has been active in supporting the local community and schools:

- The plant has provided pro bono management and technical assistance to local area governments.

- A senior plant executive in the Total Quality Management Program was loaned pro bono to the Fulton City Council to assist the members in decision making, in streamlining decision-making, and in formulating economic and industrial development strategies.

- The plant has sponsored a Partners in Education Program, which provides assistance to specific local schools which they would not otherwise obtain.

- The plant supported the development of a 911 emergency telephone system for the county.

AmerenUE has created a 6,800 acre wild life management area surrounding the plant. This is land that the company purchased when it began construction of the plant, but no longer requires. AmerenUE retained ownership of the land, but ceded it to the Missouri Department of Conservation as a wildlife management area. The company ensures species enrichment, provides conservation-type farming in the area -- leaving certain crops in the field for animals and birds to feed on in the winter, and supports related types of wildlife management. Some hunting is allowed in season, but is much more restricted than in other wildlife areas. The area is open to the public and includes hiking trails and other recreational facilities. The Callaway Plant has also had a positive impact on tourism in the area: Its visitor's center attracts thousands of persons annually, and the Callaway County and Fulton Chambers of Commerce prominently feature the Callaway plant in their promotional literature, obviously feeling that the plant is a major attraction for the region.

VII. COFFEY COUNTY, KANSAS, AND THE WOLF CREEK GENERATING STATION

VII.A. Coffey County at a Glance

Coffey County is located in southeast Kansas, 100 miles southwest of Kansas City and 120 miles northeast of Wichita. The county's population is 8,900, and its largest city, Burlington, has a population of 3,000.

VII.B. The Wolf Creek Generating Station

The Wolf Creek generating station (WCGS) is a nuclear electric power plant located in Coffey County about four miles northeast of Burlington:

- It has an electric generating capacity of 1,200 Megawatts (1,200,000 kilowatts).
- The plant utilizes a Westinghouse pressurized water reactor and the facility occupies about 10,000 acres, including a 5,000 acre cooling reservoir.
- WCGS is owned by three utilities: KGE (a Western Resources company) and Kansas City Power and Light Company each own 47 percent, and Kansas Electric Power Cooperative, Inc., owns six percent.
- The plant serves 700,000 retail customers in Kansas and Missouri.
- Construction began in 1977 and totaled $3 billion through completion in 1985.
- Every year WCGS produces the energy equivalent of 75 million tons of coal.

VII.C. Economic Benefits to the Local Area of the Wolf Creek Generating Station[39]

- The Wolf Creek Generating Station is Coffey County's largest employer.
- WCGS is the mainstay of the local economy: The next largest private employers in the county have only a small fraction of the number of workers employed at WCGS.

[39]These estimates were derived on the basis of information in *Economic Benefits of Nuclear Facilities to the Surrounding Areas*, op. cit., and discussions in April and May 2001 with staff from WCGS, officials from Coffey County and Burlington, officials from the Coffey County Chamber of Commerce, and local real estate agents.

- More than twenty percent of all persons employed in the county owe their jobs to WCGS, and WCGS-related income comprises more than 25 percent of the total county personal income.

Comparing the period since WCGS began operating with that prior to beginning of construction (early 1970s) indicates that the plant has provided substantial economic benefits to the county. The county's population had been declining for decades, but this decline has stopped and been reversed, and between 1990 and 2000 the county's population increased from 8,400 to 8,900 (six percent). Further, since the early 1970s, employment increased substantially, personal income increased more than six-fold, per capita income increased more than five-fold, and Coffey County has become wealthier relative to the nation and also to the state.

The taxes generated by the plant provide most of the county's and the school district's budgets. Taxes paid by WCGS dominate Coffey County and Burlington School District revenues: The nuclear plant's tax payments comprise over 50 percent of the taxes levied by the Burlington School District and nearly 40 percent of the total revenues for Coffey County. An important advantage of the large tax base provided by the WCGS for the Burlington School District is that it permits the District to generate capital funds for facilities and school purchases of equipment and materials. In this respect, the District has significantly better facilities than the surrounding school districts.

The plant's taxes have allowed the county to upgrade its infrastructure and attract new business and have allowed the county to lower its property tax rates while upgrading its provision of municipal services. Coffey County has used tax revenues from the plant to purchase industrial buildings and machinery. The county buys the building or the machinery and then leases it at a discount to new businesses on a lease-purchase basis. The businesses benefit by paying less for facilities and equipment, and the county benefits by attracting industrial development. The combination of low property taxes, above-average municipal services, and relatively low plant and equipment costs has been successful in attracting small and medium-sized industries to Coffey County.

WCGS's positive contributions to the county's overall quality of life also serve as a tool in recruiting industries. The tax base, employment, and salaries that the plant provides have encouraged commercial development, particularly in the incorporated towns in Coffey County, and have helped make the region's economy more stable.

The plant's tax payments were responsible for improving the county's hospital, roads, sewers, schools, and recreation facilities, and these improvements are a selling point to industrial prospects. Also, the plant has brought a more highly educated, technical work force to the county and its employees support the types of community improvements that are attractive to industries.

As noted in Chapter I of the exhibit, there are five major factors that influence property values, and WCGS has had a positive impact on each factor:

- First, the quality of the available real estate is important, and the employees of WCGS have stimulated the construction of quality housing.

- Second, good schools are a prime determinate of property values, and the revenues from WCGS have allowed Coffey county to develop an excellent school system.

- Third, reasonable property tax assessments are important, and the revenues Coffey County receives from WCGS allow the County to keep property tax assessments relatively low.

- Fourth, adequate public services and infrastructure are important and, as discussed above, the revenues from WCGS have allowed Coffey County to provide and maintain excellent public services and infrastructure.

- Finally, jobs and incomes in the local economy are critical, and WCGS provides a substantial portion of the jobs and incomes in Coffey County.

Thus, WCGS has exerted a strong, positive effect on the local real estate market and home values: Real estate in the surrounding area has consistently increased in value, and the presence of WCGS allows Coffey County to assess real estate property taxes at rates that are much lower than those of surrounding counties. In addition, the plant has protected property values. During periods of relative economic decline in the local region, the economic stability, including steady employment, provided by the facility prevented property values from decreasing, as they did elsewhere in the state and surrounding communities.

WCGS has also had a major positive impact on tourism in the area. Tourism in the area has been affected by WCGS and operations at the plant have also encouraged tourism, both directly and indirectly -- tour buses stop to see the plant and its education center.

In sum, the WCGS has been very important to Coffey County:

- The plant has given an important psychological-sociological boost to the county: It gave the county a new lease on life and stemmed a 90-year economic and demographic decline.

- The economic base provided by WCGS has allowed Coffey County to develop a first class educational system -- one of the best in the state. This is important for attracting new business, for quality education is a top selling point for enticing managers and professionals to relocate, and good schools produce skilled, productive workers for local industries.

- The quality of the WCGS labor forces is as important as the facility's payroll and taxes. Local officials emphasize that skilled workers, professionals,

scientists, engineers, and technicians contribute immeasurably to the quality of life in the area: They support educational initiatives, they support local cultural and artistic endeavors, contribute to local charities, and actively participate in all aspects of community life. They disproportionately support cultural, educational, and community activities at levels unlikely to exist if other types of industries of equivalent size were present in the area instead of WCGS.

- All of this has improved socioeconomic conditions in Coffey County and given the county the means to keep its young people from moving away and to attract back some of its citizens who have migrated in recent years. This effect is difficult to quantify, but is important to many local residents.

VIII. COMPARISON WITH THE ESTIMATED BENEFITS OF THE PROPOSED OWL CREEK, WYOMING, SPENT FUEL STORAGE FACILITY

The University of Wyoming conducted an economic analysis of the potential impact of the proposed Owl Creek Energy Project, near Shoshoni, Wyoming.[40] This project is similar in scope to the PSFS, and is a proposed, above-ground storage facility for up to 40,000 metric tons of used or spent fuel generated at U.S. nuclear power plants. While the economic benefits of the project would be realized statewide, the UW analysis concentrated on the benefits to the two counties nearest the project site. The analysis employed methods commonly used by the U.S. Department of Commerce, state governments, and private industry to analyze economic development programs, and our review of the study confirmed its general validity.

While there will be some differences in the economic impacts of PFSF and of Owl Creek, this study does represent the most comprehensive econometric analysis of the potential impact of a facility very similar in size and function to PFSF, and its results are thus worth reviewing.

The study estimated the economic effects of the project by utilizing economic input-output analysis, beginning with the input-output data developed by the Bureau of Economic Analysis of the U.S. Department of Commerce. The national I-O model was regionalized by using only the relevant subset of industries and adjusting the remaining industries in the model on the basis of their concentration in the local area through the use of location quotients.

The researchers developed five models of the local area. One model was used to estimate the economic contribution of the Owl Creek facility, three were used to estimate the economic impact of operating the facility, and one was used to estimate the impact of returning the site to Greenfield status.

The UW study found that the economic contribution of Owl Creek would be significant to the state and, in particular, to the immediate and adjacent geographical communities, and that it would generate nearly $2 billion in local incomes over the 40 year life of the project and create nearly 3,000 jobs at its peak of operation. Other benefits would accrue from the project's proposed state benefits package. Specifically, the study estimated that the project would annually:

- During construction, create $23 million in income and 600 jobs.
- During peak operations, create $78 million in income and 2,800 jobs, assuming that 50 percent of the fuel storage containers are manufactured in Wyoming. If 25 percent of the containers are manufactured in Wyoming, the project would create $48 million in income and 1,500 jobs.
- During the storage monitoring phase, create about $3 million in income and 150 jobs.

[40]Shelby Gerking, "Economic Analysis of the Owl Creek Energy Project." University of Wyoming, January 18, 1999.

- During the phase when the fuel is removed to the permanent repository, create $10 million in income and about 200 jobs.

- During the return of the site to Greenfield status, create about $34 million in income and 375 jobs.

Depending on the assumptions made -- especially the degree to which the fuel storage canisters are manufactured within state, the economic impacts estimated by the UW study should be generally applicable to the PFSF.

IX. TOOELE COUNTY ECONOMIC AND DEMOGRAPHIC PROFILE

Tooele County covers 6,946 square miles and is the second largest county in Utah, encompassing a large portion of the state's western desert. Although large in size, the county is sparsely populated, with a 1999 population of 35,850 (eighth largest in Utah). Tooele City is the county seat and the largest city, with a 1999 population of slightly more than 17,000. The Oquirrh Mountains form much of the county's eastern boundary, isolating it from heavily populated Salt Lake County to the east. The valley that forms below the Oquirrh's western slope harbors the population centers of Tooele County.

Most of the county is arid desert lands largely utilized by the nation's military establishment and has thus not been available for development. Since World War II, the county's economy has been dominated by national defense. This has provided many residents with a high standard of living, but to a degree, has also served to limit the area's growth potential. The closure of Tooele Army Depot North in 1990 is leading to the county's conversion to civilian industrial use. Given its proximity to the Salt Lake International Airport, transportation arteries, and available land, Tooele County's potential for economic development is generally favorable.

For 50 years, Tooele County was heavily dependent on defense spending, and U. S. Army bases were the backbone of the county's economy. However, with the defense downsizing that occurred during the 1990s, national defense has become a smaller part of the county's economic structure and other industries have emerged, producing a more diverse economic base. Growth issues are a new challenge, as the expansion of Utah's population mass along the Wasatch Front is beginning to reach westward into Tooele County.

Below we summarize the basic demographic and economic data on Tooele County derived in the course of this research.

IX.A. Population

- For 1999, Tooele County's population was estimated at 35,850, an increase of eight percent from 1998, and represents 1.7 percent of the total Utah population.

- Tooele City is the county seat and largest city, with a 1999 population estimated at 17,000.

- Tooele County's population growth accelerated in the late 1990's. Utah's population mass is expanding beyond the Wasatch Front and "spilling over" into Tooele County, and this trend is likely to continue.

- Historically, population migration patterns in Tooele County go through multi-year phases. Several years of net in-migration occur, which are followed by periods of out-migration. The 1990's was a decade of net in-migration.

- The main migration interaction that occurs is with Salt Lake County. In earlier years, when people moved from Tooele County, their destination was generally Salt Lake County. However, over the past decade, there have been many more people moving from Salt Lake County into Tooele County.

IX.B. Employment

- The federal government, primarily at U.S. Army bases, was for many years the dominant employer in Tooele County. For example, Federal government employment in 1989 accounted for 61 percent of all employment in the county.

- As a results of the end of the Cold War and Department of Defense downsizing, federal government employment in the county declined from a high of 5,100 workers in 1989 to 1,800 by 1998.

- As federal employment has decreased, the Tooele County economy has diversified as other industries expanded. This is an advantage for the county, since a more diversified economy is generally a more stable economy, and declines in some industries may be offset by growth in others.

- Tooele County's 1998 nonfarm employment averaged 10,600, and increased 9.2 percent since 1995.

- However, employment in the county in 1998 only reached the employment level of 1989. Over this decade, employment in the county decreased and then rebounded, while the rest of the state's economy went through a period of strong economic growth. Tooele County was Utah's slowest-growing county in terms of employment between 1989 and 1998.

- Despite the fact that federal government employment has declined in the county, government is still the largest single employer, accounting for 31.7 percent of all employment. However, local government employment is currently almost as large as federal government employment, and the local school district dominates local government employment.

- The trade industry -- primarily restaurants -- is the next largest employer, accounting for 17.2 percent of employment.

- Manufacturing accounts for 14.3 percent of employment, and with the marketing of Tooele Army Depot North for industrial purposes, manufacturing should continue to be a growth segment of the economy.

- The waste disposal industry, including Envirocare, became a major employer in the county during the 1990s, employing over 1,000 workers.

- Federal government expenditures of $231 million in 1998 in the county are substantial for a county of Tooele's size. However, non-defense federal expenditures, such as Social Security, Medicare, federal employee retirement, etc., are currently higher than defense-related federal expenditures.

- The 20 largest employers in the county are, in rank order:
  - -- Tooele Army Depot
  - -- Tooele County School District
  - -- EG&G Defense Material
  - -- Magnesium Corporation
  - -- Dugway Proving Grounds
  - -- Detroit Diesel
  - -- Tooele Valley Healthcare
  - -- Tooele County Corporation
  - -- Wal-Mart
  - -- Envirocare of Utah
  - -- Safety Kleen
  - -- Tooele City Corporation
  - -- Lockheed Martin
  - -- Morton International
  - -- Broken Arrow, Inc.
  - -- Smiths Food King
  - -- TA Operating Corporation
  - -- Albertson's
  - -- Flying J
  - -- NAF Financial Services

IX.C. Wages and Income

- Tooele County's 1998 average annual wage totaled $29,520, the third highest in Utah, and was 11 percent higher than the statewide average annual wage.

- Tooele County has a history of higher-than-the-state-average monthly wages. However, its advantage has been shrinking -- in 1994 the county's wages were 24 percent higher than the statewide average.

- The industries responsible for this higher-than-the-state-average wage include mining, construction, manufacturing, and government.

- Wages account for 73 percent of the county's total personal income. This closely mirrors the statewide average, but other income shares differ from the state average.

- Incomes derived or augmented through dividends, interest, and rents generally produce higher income levels than those derived from wages and salaries. While these account for 13.3 percent of the statewide personal income, they constitute only 7.6 percent of Tooele County's personal income.

- Transfer payments, the third source of personal income, is comprised of fixed-income sources, such as Social Security, welfare, retirement benefits, etc. This is generally a lower-income component. While it accounts for 14.9 percent of the statewide personal income, it represents 19.9 percent of Tooele County's personal income.

- This heavier-than-average reliance on transfer payments explains why Tooele County, with an average wage per worker significantly higher than the statewide average, has a lower per capita personal income ($17,100 for 1997) than the statewide average ($20,432).

IX.D. Other Economic Indicators

- Construction activity in Tooele County increased during the 1990s, with an especially large increase in 1997 that continued into 1998.

- Residential construction was extensive in 1997 and 1998, the result of Salt Lake County's population "spilling" around the mountain and into Tooele County. This spillover effect will likely continue for the foreseeable future, due to the county's proximity to Salt Lake City and the fact that it is becoming a bedroom community for the city.

- While new residential permits approved reached a new high in 1996 at 323 units, 1997's approval of 1,013 units exceeded that level and marked a dramatic change from the county's historical pattern. This continued in 1998 with the approval of 1,012 residential units. Local officials feel that the

Envirocare facility has been responsible for at least a portion of this activity because the facility has given the county another source of income other than defense-related spending (which accounted for 85 percent of county income) at a time when defense spending in Tooele County has been declining.[41]

- Most of the new construction is single-family homes, but in 1997 and 1998 more multi-family units were approved than ever before.

- Tooele County's taxable sales are strong and rising, and taxable sales have increased substantially every year since 1993.

[41]Based on discussion with the Executive Director of the Tooele County Chamber of Commerce, May 2001.

Table 7
Tooele County Demographic Data

Tooele County Population

As of July 1	**1995**	**1996**	**1997**	**1998**	**1999**
Total Population	29,547	30,493	31,997	33,202	35,847
% Change from Prior Year	0.8%	3.2%	4.9%	3.8%	7.9%

Source: Utah Governor's Office of Planning and Budget

Populations Centers in Tooele County -- 1999

Grantsville	6,160
Rush Valley	406
Stockton	543
Tooele City	16,907
Vernon	206
Wendover	1,378
Remainder	10,214

Table 8
Tooele County Labor Force

	1995	1996	1997	1998	1999
Labor Force	11,178	11,394	11,517	11,659	11,794
Employed	10,549	10,795	11,013	11,074	11,137
Unemployed	629	599	504	585	657
Rate	*5.6*	*5.3*	*4.4*	*5.0*	*5.6*
Nonfarm Jobs	9,713	10,208	10,393	10,602	na
% Change Prior Year	*1.4*	*5.1*	*1.8*	*2.0*	na
Mining	213	180	121	68	na
Construction	605	719	815	814	na
Manufacturing	1,050	1,183	1,499	1,517	na
Trans/Comm/Utilities	1,301	1,354	1,274	1,273	na
Trade	1,600	1,643	1,743	1,823	na
Finance/Ins./Real Estate	171	180	221	295	na
Services	1,315	1,293	1,348	1,446	na
Government	3,458	3,656	3,372	3,366	na
Total Establishments	527	549	570	616	na
Total Wages ($000,000)	259.8	284.7	298.9	313.0	na

Source: Utah Department of Workforce Services

Table 9
Tooele County Economic Data

Income and Wages

	1994	1995	1996	1997	1998
Total Personal Income ($000,000)	440	472	508	552	573
Per Capita Income	$16,000	$16,090	$16,264	$17,542	$17,200
Avg. Household Income (Tax Data)	$35,293	$37,485	$38,721	$40,819	$42,642
Average Annual Nonfarm Wage	$27,877	$26,742	$27,892	$28,768	$29,526

Source: U.S. Bureau of Economic Analysis; Utah State Tax Commission; Utah Department of Workforce Services

Other Indicators

	1994	1995	1996	1997	1998
Gross Taxable Sales ($000)	189,413	204,823	229,458	247,598	282,755
Permit-Author. Construction ($000)	26,651	29,157	31,487	86,661	120,770
New Residential Building Permits	230	271	323	1,013	1,102
Res.Building Permit Value ($000)	22,351	24,008	28,868	76,347	92,102

Source: Utah State Tax Commission; University of Utah Bureau of Economic and Business Research

Table 10
Tooele County and Utah
Summary Indicators

	Tooele County	Percent of State	Index of State 1/	Utah	% of U.S.	Index of U.S. 1/	Period
Population	35,801	1.7	-	2,129,836	0.8	-	1999
Percent change	34.6	-	147	23.6	-	246	1990-99
Male	18,144	1.7	-	1,058,639	0.8	-	1999
Female	17,657	1.6	-	1,071,197	0.8	-	1999
Percent under 18	33.4	-	101	33.2	-	129	1999
Percent 65+	8.0	-	92	8.7	-	69	1999
Percent White	96.1	-	101	95.1	-	115	1999
Percent Black	1.0	-	111	0.9	-	7	1999
Percent Native American	1.7	-	121	1.4	-	156	1999
Percent Asian	1.2	-	46	2.6	-	65	1999
Percent Hispanic	15.9	-	224	7.1	-	62	1999
Percent White non-Hispanic	80.9	-	91	88.6	-	123	1999
Median household income	$42,277	-	109	$38,884	-	105	1997
Persons below poverty (percent)	9.0	-	90	10.0	-	75	1997
Children below poverty (percent)	11.9	-	95	12.5	-	63	1997
Private nonfarm establishments	438	0.8	-	52,025	0.7	-	1998
Private nonfarm employment	6,168	0.7	-	866,146	0.8	-	1998
Percent change	83.2	-	161	51.7	-	329	1990-98
Manufactures shipments (000)	$342,760	1.4	-	$24,014,379	0.6	-	1997
Retail sales (000)	$182,763	0.9	-	$19,964,601	0.8	-	1997
Per capita	$5,802	-	60	$9,666	-	105	1997
Housing building permits	938	4.6	-	20,455	1.2	-	1999
Federal funds and grants (000)	$226,222	2.4	-	$9,238,662	0.6	-	1999
Local government employment	1,183	1.9	-	63,884	0.6	-	1997
Land area (square miles)	6,946	8.5	-	82,168	2.3	-	1990
Persons per square mile	5.2	-	20	25.9	-	33	1999

1/ Index of 100 represents equal share

Source: U.S. Department of Commerce, Census Bureau, *State and County Quickfacts*, and Management Information Services, Inc., 2001.

Table 11
2000 Population Census Data for Tooele County and Utah

Number		Total	White	Black	Native American	Asian	Two or Other	Hispanic (any race)
Utah		2,233,169	1,992,975	17,657	29,684	37,108	155,745	201,559
Tooele County		40,735	36,330	521	694	244	2,946	4,214
Census Tract	1306	3,984	2,265	321	271	70	1,057	1,213
	1307	11,159	10,519	86	121	43	390	610
	1308	4,709	4,513	3	41	13	139	218
	1309	3,355	2,997	14	79	5	260	370
	1310	8,027	7,175	42	96	55	659	912
	1311	6,183	5,743	45	70	32	293	521
	1312	3,318	3,118	10	16	26	148	370
Tooele County as a Percent of Utah								
		1.8	1.8	3.0	2.3	0.7	1.9	2.1
Census Tracts as a Percent of Tooele County[42]								
	1306	9.8	6.2	61.6	39.0	28.7	35.9	28.8
	1307	27.4	29.0	16.5	17.4	17.6	13.2	14.5
	1308	11.6	12.4	0.6	5.9	5.3	4.7	5.2
	1309	8.2	8.2	2.7	11.4	2.0	8.8	8.8
	1310	19.7	19.7	8.1	13.8	22.5	22.4	21.6
	1311	15.2	15.8	8.6	10.1	13.1	9.9	12.4
	1312	8.1	8.6	1.9	2.3	10.7	5.0	8.8

Source: U.S. Department of Commerce, Census Bureau, *Redistricting Data*; and Management Information Services, Inc., 2001.

[42]The Census tracts in our report are identical to the Census tracts that are referred to in the DEIS. However, our data are unadjusted (raw) data from the 2000 Census, whereas the DEIS contains adjusted data from the 1990 Census. Adjusted Census 2000 data are not currently (May 2001) available at the block level as shown in the DEIS. In addition, there has been a slight shift in demographics between the DEIS data and those shown in the latest Census figures.

Table 12
Personal Income Growth, 1980-1998, in Utah and Tooele County

	Tooele				
	1980	1990	1998	1980-90	1990-98
				percent change	
Personal income (000,000)	$217	$397	$611	83	54
Per capita income	$8,278	$14,889	$18,244	80	23
Earnings by industry (000)					
Farm	$1,615	$4,326	$1,927	168	-55
Agriculture services	426	694	1,467	63	111
Mining	25,275	9,900	6,847	-61	-31
Constructi on	5,340	15,000	32,211	181	115
Manufacturing	27,173	35,595	59,456	31	67
Transportation & Utilities	6,274	8,482	62,804	35	640
Wholesale trade	387	722	2,838	87	293
Retail trade	8,498	15,599	24,350	84	56
Finance & Real estate	2,079	2,693	16,038	30	496
Services	11,572	38,435	56,560	232	47
Govt.	120,744	231,931	160,581	92	-31

	Utah					United States	
	1980	1990	1998	1980-90	1990-98	1980-90	1990-98
				percent change		*percent change*	
Personal income (000,000)	$12,464	$25,939	$46,717	108	80	111	50
Per capita income	$8,464	$14,996	$22,240	77	48	92	39
Earnings by industry (000)							
Farm	$63,711	$245,858	$192,929	286	-22	106	-2
Agriculture services	21,780	54,516	139,800	150	156	190	55
Mining	529,004	366,730	431,132	-31	18	0	31
Constructi on	766,257	1,071,365	2,783,484	40	160	94	46
Manufacturing	1,621,331	3,081,181	4,955,043	90	61	59	34
Transportation & Utilities	822,404	1,548,846	2,612,322	88	69	77	57
Wholesale trade	658,507	1,151,843	2,036,577	75	77	94	49
Retail trade	956,924	1,799,115	3,648,602	88	103	90	45
Finance & Real estate	451,305	925,416	2,792,656	105	202	142	96
Services	1,547,356	4,806,294	9,472,210	211	97	181	69
Govt.	2,161,407	4,343,135	6,475,566	101	49	103	35

Source: U.S. Bureau of Economic Analysis and Management Information Services, Inc., 2001.

X. LOCAL JURISDICTIONS' USE OF INCREASED REVENUES GENERATED BY LARGE INDUSTRIAL AND COMMERCIAL FACILITIES

Our research indicates that, in general, how county governments allocate the increased revenues generated from taxes and fees from a large new industrial facility, or a facility similar to the PFSF, depends on several factors.

First, if the governments view the increased revenues as a one time lump sum revenue windfall, they will allocate the increased funds to capital projects, such as roads, bridges, school buildings, etc.[43]

Second, in the case where the governments view the revenues to be recurring on an annual basis (as will be the case with the PFSF), they will divide the increased revenue stream between tax reductions and earmarking for special purposes -- usually education.[44] Local governments are reluctant to reduce taxes significantly because, once taxes are lowered, it is usually difficult politically to raise them, even when economic and fiscal conditions require it. Therefore, the preferred option is usually earmarking a major portion of the increased revenues for purposes that have strong local political support, such as education.

More specifically, we found that local governments in areas where nuclear facilities are located usually allocate the increased revenues generated to education, to tax relief, and for improvements in local infrastructure designed to attract other business and industry.

In addition to our research on the use made of the increased revenues generated by the nuclear facilities in the seven case studies, we also examined the uses made of the revenues generated by various types of industrial and power plant facilities around the country. The results of this research supported our general conclusion that the revenues generated by these facilities are most commonly used to support education and to reduce local taxes. For example:

- Dallas, Texas-based Panda Energy International, Inc. is building a 1,000 MW electric power plant in Archer County, Texas, and the county revenues generated by this plant will be used to triple the local Holliday School District budget. The school district plans to use the increased revenues to raise teachers' pay, construct new facilities, and hire additional custodians and maintenance staff.[45]

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[43]Based on discussions with officials from the National Association of Counties and the Council for Urban Economic Development, April 2001.

[44]Ibid.

[45]Panda Energy International, Inc., "$200 Million Clean Energy Project is Slated for Archer County, Will Generate New Jobs, Enhance School Tax Revenue," April 1, 1999; Curry, Matt. "Area Towns Tickled Pink With Prospect of Power Plant," *Times Record News*, April 1, 1999.

- NES, Inc. is constructing a $1.2 billion electric power plant in Norton, Ohio, and of the $21 million in additional annual revenues that will be generated for Norton, $17 million will be allocated to local schools.[46]

- The impending reorganization of operations of Niagara Mohawk Power Co. power plants in Oswego County, New York resulted in an agreement that over the next ten years grants the county $115 million in revenues. The county will use the guaranteed revenues to support local schools and to reduce county property taxes by four percent.[47]

- Macomb Township, Michigan has made a concerted effort over the past decade to attract industry to increase the city's revenues. It has been successful and, due to the industrial growth, officials have been able to reduce township taxes for the past five years.[48]

- Stone and Webster recently constructed a new power plant in Carroll Township, Pennsylvania that generates substantial new revenues for the township. Of the additional revenues generated, 71 percent were allocated to local school districts and municipalities and 29 percent to the Public Transportation Assistance Fund.[49]

- During the 1990s, revenues generated by the Clinton Nuclear Power plant, in Clinton, Illinois, accounted for 73 percent of the budget of the Clinton School District.[50]

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[46]Norton Energy Storage (NES), Inc. is constructing a high-tech plant that will use compressed air to generate electricity during peak use periods; see Dennis McEaneney, "Norton, Schools May Reap Windfall," *The Beacon Journal*, October 29, 2000.

[47]Oswego County, "County Officials Welcome News of Scriba's Nuke Plant Tax Deal." *Fulton Daily News*, November 17, 2000; Oswego City School District, "Student Success Ultimate for Oswego City Schools; District Faces Tax Revenue Reductions." *Fulton Daily News*, 2001.

[48] Sheri Hall, "Industry Helps Build Growing Communities," *The Detroit News*, January 28, 2001.

[49]Liz Dudley, "Carroll Twp. Would Receive $60 Per Year in Tax Revenue From Power Plant," *Perry County Times*, January 1999; "Power Plants Look Attractive." *Allentown Morning Call*, July 23, 1999.

[50]Ron Ingram, "Value of Power Station Less than 60 Percent of Last Year," *Herald & Review*, December 22, 2000..

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	

DECLARATION OF GEORGE CARRUTH

George A. Carruth states as follows under penalties of perjury:

A. Background

1. I am currently an independent consultant. I completed a 30-year career in the U.S. Army Chemical Corps in June 1987. Following my military career, I worked for TRW, Inc as System Integration Manager on the Department of Energy Management and Operating Contract for the Civilian Radioactive Waste Management System. I retired from that position in 1998. I am providing this declaration in support of a motion for summary disposition of Contention OGD O in the above captioned proceeding to assess the cumulative hazards posed to members of the Skull Valley Band of Goshutes by the Private Fuel Storage Facility (PFSF) and by hazardous wastes from Dugway Proving Ground, Deseret Chemical Depot[1], Tooele Army Depot, Envirocare Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill.

2. I am knowledgeable of the activities that will take place at the PFSF on the basis of my review of PFSF documents, discussions with people knowledgeable of the PFSF, and work on the design of similar facilities. I am knowledgeable of the activities

[1] Deseret Chemical Depot is also known as Tooele Army Depot South

at Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill on the basis of review of documents describing the facilities and their environmental impact. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this declaration. During my career in the U.S. Army Chemical Corps, I commanded Dugway Proving Ground (DPG) from July 1981 until July 1984. In this capacity, as well as in other Army management assignments, my responsibilities included review of environmental studies of military activities to determine what acute and chronic effects these activities would have on Army personnel and the general public. This evaluation required an understanding of the effects of chronic exposures to hazardous chemicals. After my military career, I was employed by TRW, Inc. for 11 ½ years, retiring December 31, 1998. My last position with TRW was System Integration Manager on the Department of Energy Management and Operating Contract for the Civilian Radioactive Waste Management System. In that position, I was responsible for developing requirements documents for the transportation, storage (including dry storage of spent nuclear fuel in casks similar to those to be used at the PFSF), and disposal elements of the waste management system.

3. Contention OGD O, as admitted by the Licensing Board, alleges that the Applicant's Environmental Report (ER) (and the NRC's Draft Environmental Impact Statement (DEIS)) for the PFSF inadequately considered environmental justice and the cumulative effects of Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, Grassy Mountain Hazardous Waste Landfill and the PFSF on members of the Skull Valley Band of Goshutes and the Goshute Reservation. Specifically, OGD O contends in part that the ER (and the DEIS) incompletely addressed the cumulative and disproportionate impacts that members of the Skull Valley Goshutes may be made to suffer.

B. Description of Facilities

1. Dugway Proving Ground

4. Dugway is located 12 miles southwest of the PFS site. The mission of Dugway is to test U.S. and Allied biological & chemical defense systems; perform Nuclear Biological Chemical survivability testing of defense material; provide support to chemical and biological weapons conventions; and operate and maintain an installation to support the test mission. Waste management activities associated with laboratory operations, testing, open burning/open detonation, clean-up of contaminated sites, and facility maintenance are regulated by the Chemical Demilitarization Section of the Utah Division of Solid and Hazardous Waste. Dugway is regulated under interim status rules through a Resource Conservation and Recovery Act ("RCRA") Part B Storage Permit, and other applicable RCRA regulations. Compliance with permit conditions and all other RCRA regulations is monitored by the Chemical Demilitarization Section.

5. The Combined Chemical Test Facility at Dugway Proving Ground is a complex made up of more than 35,000 square feet of laboratory and administrative work space. Chemists and technicians put military defensive equipment through its paces inside this facility's 27 laboratories. Work with chemical agents is performed in laboratories with agent test hoods. The purpose of the test hoods is to provide a level of protection to both workers and the public. The hoods are exhausted through charcoal-filter banks, each made up of a five-stage system, which removes the test agent from the effluent air stream. An uninterruptable power supply, a spill-control system, and redundant safeguards ensure that there is no toxic chemical agent release to the environment.

6. The Defensive Test Chamber (DTC) supports tests on large chemical defense items inside a chemical or biological stimulant aerosol or vapor environment. The chamber is a 30-by-30-by-50-foot stainless steel room that can replicate a variety of environmental conditions. Testers can use a variety of interferents during tests inside the DTC to attempt to confuse detectors being challenged by chemical or biological simulants. These interferents, such as signal smoke, fog oil, smoke from burning brush or rags, help

testers replicate real-world battlefield environments. Here government and contractor employees challenge detectors, protective clothing and equipment, and decontamination systems to ensure their successful operation on the battlefield.

7. The Life Sciences Test Facility is where all tests using biological toxins and pathogens, up to and including biosafety level 3 are performed inside sealed containment chambers. Every effort is made to use simulants, killed agents or the least virulent strains in tests if the results would accurately represent their goals. Only simulants are used in outdoor field tests. Key features of the Life Sciences Test Facility include Class II Biosafety Cabinets which are used for liquid challenges in baseline testing to determine the threshold concentration levels of detection by biological detectors; environmental chambers where tests on biological detectors are performed using liquid biological simulants; the Aerosol Simulant Exposure Chamber used for biological simulant aerosol generation and exposure of equipment; and the Containment Aerosol Chamber which is an environmentally controlled chamber used in challenging biological samplers and detectors with aerosolized agents of biological origin. The Life Sciences Test Facility is designed so that the materials used in the facility, both simulants and biological toxins and pathogens, are not released to the environment or affect the scientists that work in the facility.

8. The Materiel Test Facility (MTF) is a large controlled environment test chamber that allows tests of large vehicles and aircraft, including tanks or fighter aircraft. High-tech capabilities ensure testing in the MTF can replicate real-world battlefield conditions. Test environments can include the use of chemical agents and simulants, as well as any number of interferents, such as signal smoke, fog oil, burning brush or rags. These are used in attempts to confuse the chemical detectors during testing. Other MTF chambers include the Agent Transfer Chamber (ATC) and the Closed System Chamber (CSC). The ATC, which measures 25-by-25-by-20 feet, supports agent transfers, monitoring, and dissemination. The CSC, which is the same size as the ATC, supports small chamber and

glovebox tests. Safeguards at this desert facility include negative air pressure, an emergency generator, controlled entry, and an intrusion detection system.

9. Many of Dugway's test facilities are located in the Ditto Test Area, approximately 12 miles west of the installation's main gate. The biological test facility is situated farther west in Dugway's remote desert area.

10. The Central Hazardous Waste Storage Facility (CHWSF) stores containerized hazardous waste from the Dugway Facility generated from maintenance, training and testing programs. The CHWSF is operated under the control of the Dugway Directorate of Environmental Programs and is managed by a contractor who is responsible for the daily activities at the CHWSF.

11. The Igloo G hazardous waste storage building stores chemical agent hazardous waste munitions that are called range recovered munitions and munitions that will be used at Dugway for training and testing. Additionally, Chemical agents and industrial chemicals are stored at the Igloo G building.

2. Tooele Army Depot

12. Tooele Army Depot (North) is located approximately 22 miles northeast of the PFS site, in Rush Valley, on the other side of the Stansbury Mountains. The mission of Tooele Army Depot is conventional ammunition storage, maintenance and demilitarization. The 24,000-acre site contains over 900 munitions storage igloos, as well as, the Depot headquarters and administrative offices. Most of the Depot's two million square feet of secured munitions storage space is in these igloos, spread out across the valley floor. Also located within the Depot boundary is an open burn area for the disposal of surplus and unserviceable conventional munitions. Except for the ammunition mission described above, the majority of the area is in an environmental cleanup mode. In March 1993, part of the Depot (1,740 acres) was placed on the Base Realignment and Closure (BRAC) list. As a BRAC site, forty acres were transferred by the US Army for private use in 1996. The remaining 1,700 acres of the BRAC parcel were transferred to develop-

ers and annexed by the city of Tooele in January of 1999. Contaminated areas in the 1,700 acre parcel will be cleaned up by the US Army. The remaining 22,000 acres of the Depot will be retained by the Army for continued storage of conventional ammunition.

13. Currently, the Depot has RCRA Hazardous Waste Storage and Incineration, and Post-Closure Permits. Tooele Army Depot is on the CERCLA National Priorities list and has entered into a Federal Facilities Agreement with EPA Region 8, as a result of past disposal practices of wastewater into unlined ditches. An initial environmental assessment of the Depot, completed in 1979, reported that a potential for contamination existed at an area where explosives were burned or detonated in the open. Studies since that time revealed contamination in soils and ground water associated with equipment maintenance, munitions disposal and other industrial activities. Some of the contaminants of concern are explosives, lead, cadmium, barium, pesticides, hydrocarbons, solvents, waste oils and polychlorinated biphenyls (PCBs). Between 1991 - 1993, the Army constructed one of the country's largest groundwater treatment plants to address a plume of contaminated ground water that had migrated off base. This plume has now retreated back within the Depot boundaries. A second contaminant plume is being investigated on the eastern side of the base. No other contamination off-site has been reported.

3. Deseret Chemical Depot

14. The Deseret Chemical Depot (also known as Tooele Army Depot South) is located approximately 23 miles southeast of the PFS site, also in Rush Valley, on the east side of the Stansbury and Onaqui Mountains. The primary mission of the Deseret Chemical Depot is storage of a large percentage of the United States stockpile of chemical munitions. The depot also supports weapons demilitarization and research and development activities. The depot is to support disposal of 42.3% of the nation's chemical weapons at the co-located Tooele Chemical Demilitarization Facility (see paragraph 15). The chemical munitions, which consist of mustard and nerve agents, are stored in 208 igloos at the facility, awaiting disposal, according to international treaties.

15. While not organizationally a part of the Deseret Chemical Depot, the Tooele Chemical Demilitarization Facility is located within Deseret Chemical Depot's area. The mission of Tooele Chemical Demilitarization Facility is to destroy the aging chemical munitions stockpile in storage at the Deseret Chemical Depot. The demilitarization process is regulated by the Chemical Demilitarization Section of the Utah Division of Solid and Hazardous Waste through a RCRA Part B Permit. Hazardous Waste Activities allowed by the permit include treatment by incineration; storage and treatment in tanks; and treatment by separation of munition components. Conditions in this permit include requirements for waste analysis; air monitoring; training; security; emergency response; pollution prevention; design; construction; and operational parameters. The Chemical Demilitarization Section provides an oversight program to ensure compliance with all permit conditions. The CAMDS (Chemical Agent Munition Destruction/Disposal System) pilot plant was constructed in the 1970's to develop disposal methods for conventional and chemical munitions.

4. Envirocare Mixed Waste Storage Facility

16. Envirocare of Utah, Inc. ("Envirocare") is a commercial radioactive waste disposal facility located 80 miles west of Salt Lake City in western Tooele County, approximately 26 miles northwest of the PFS site. The site is located on an ancient lake bed just west of the Cedar Mountains. Radioactive wastes are disposed of by modified shallow land burial. The facility began operation in 1988. Envirocare is licensed by the Division of Radiation Control (DRC) to dispose of Naturally Occurring Radioactive Materials (NORM) and Low Level Radioactive Waste (LLRW) and mixed waste less than Class A. Envirocare is not currently allowed to accept Class B and C low level waste. On November 1, 1999, Envirocare submitted a license modification request to the Division of Radiation Control to receive and dispose of containerized Class A, B, and C low-level radioactive wastes.

5. APTUS Hazardous Waste Incinerator

17. The APTUS Incinerator, now known as Safety-Kleen (Aragonite), is a commercial incinerator, transfer, and storage facility located in a remote area of Tooele County, Utah, approximately 25 miles northwest of the PFS site. It was formerly known as Laidlaw Environmental Services (Aragonite), Inc. and APTUS, Inc. The incinerator is authorized to handle wastes identified by the waste codes in 40 CFR 261.21, 261.22, 261.23, 261.24, 261.31, 261.32, and 261.33 as revised July 1, 1999, subject to the restrictions that the following shall not be accepted for management at the facility at any time:

a. Water reactive wastes or materials (defined as DOT Division 4.3, and in R315-2-9(f)(1)(ii)-(iv)). However, small quantities (less than four liters) may be accepted in lab packs as described in Attachment 1to the permit.

b. Pyrophoric wastes or materials (defined as DOT Division 4.2(1)).

c. Explosive wastes or materials (defined as DOT Forbidden, DOT Division 1.1, 1.2, and 1.3 explosives, DOT Division 4.1(2) Type A and Type B materials, and in R315-2-9(f)(1)(vi)-(viii)).

d. Shock sensitive wastes or materials.

e. Radioactive wastes or materials (defined as having a count rate greater than three times the background value).

f. Any waste or material exhibiting the property identified in R315-2-9(f)(1)(i).

g. Any waste carrying a Utah State or EPA waste code not identified in Condition 2.C.1.

18. The incinerator is a 140 million BTU slagging rotary kiln with a vertical afterburner chamber. The gas cleaning train consists of a spray dryer, baghouse, saturator, wet scrubber, and wet electrostatic precipitator. Permitted waste storage areas include a bulk liquid tank farm (sixteen ~30,000 gallon tanks); drum storage buildings (~10,000 drum capacity); sludge storage tanks (~38,000 gallon total capacity); and bulk solids storage tanks (~1100 yd^3 total capacity). The storage tanks are for storage of wastes prior to incineration. The wastes that are handled at the facility include hazardous wastes, PCBs, industrial wastes, and other non-hazardous wastes. The facility is designed to handle high and low BTU liquid wastes, sludges, bulk solids, and containerized wastes. The

current permitted capacity of the incinerator is approximately 13 tons per hour. It typically processes approximately 50,000 tons per year. Operations occur 24 hours a day. There are approximately 180 employees at the site.

6. Grassy Mountain Hazardous Waste Landfill

19. The Grassy Mountain facility is a commercial, hazardous waste, treatment, storage and disposal facility located near Knolls, Tooele County, Utah. It lies approximately 80 miles west of Salt Lake City, Utah in the desert portion of the Bonneville basin near the Grassy Mountains. The site is one square mile in area and is located approximately 37 miles northwest of the PFS site. It is owned and operated by the Safety-Kleen Corporation. Because of its desert setting, the site is ideal for land disposal. Annual precipitation averages 6 inches, while the yearly evaporation rate averages about 48 inches. Relative humidity rarely exceeds 10 percent. There are no perennial streams or rivers within a 40 mile radius of the facility; the nearest surface water is the Great Salt Lake, 30 miles to the northeast. A shallow, nonpotable aquifer resides in the lake deposits below the site. The depth to the groundwater averages about 12 feet, and the aquifer's flow is generally west-northwest. The Grassy Mountain facility is capable of handling hazardous wastes, PCB contaminated wastes and oils, industrial wastes and other nonhazardous wastes. The facility can accept liquid, solid or semi-solid waste forms for treatment, storage, and/or disposal. The Grassy Mountain facility consists of six RCRA landfill cells, five Toxic Substances Control Act ("TSCA") landfill cells and three industrial waste landfill cells. Three RCRA cells have been closed along with two industrial waste cells. One TSCA cell and one industrial waste cell have never been used. The facility was issued a RCRA Part B Permit by the Utah Division of Solid and Hazardous Waste on June 30, 1988 which was revised on April 15, 1996.

7. USPCI Clive Incineration Facility

20. The Clive facility is <u>not</u> one of the facilities enumerated in Contention OGD O. The facility is currently idled and is being closed, but the environmental analysis performed in the facility Environmental Impact Statement is useful in providing a

conservative assessment of potential cumulative effects from the facilities listed in OGD O on OGD and the Skull Valley Goshute Reservation. The Safety-Kleen (Clive), Inc. facility, formerly known as the Clive Incineration Facility, was designed to treat and store hazardous waste. The Clive facility is located in Western Tooele County, near the APTUS and Envirocare sites, approximately 25 miles northwest of the PFSF. The Clive EIS discussed cumulative impacts from facilities in western Tooele County, including those listed in OGD O.

C. Cumulative Effects Analysis

21. The relative locations of the Skull Valley Goshute Reservation, the PFSF, Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Low-Level and Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill are important factors when addressing the potential cumulative impacts caused by hazardous materials at the listed facilities. The Skull Valley Goshute Reservation is indicated as Item 14 on the map at Exhibit 2.[2] Dugway Proving Ground (Item 13 on attached map) lies approximately 10 miles southwest of the Reservation. This is the distance to the main administrative area while the areas used for storage, disposal, and use of hazardous materials lie another 8 or more miles further to the southwest. Deseret Chemical Depot is located southeast of the Reservation in Rush Valley (on a line between Ophir and Rush Valley on the map). The chemical agent disposal facilities are approximately 20 miles from the reservation. Tooele Army Depot is located just to the west of the town of Tooele and is approximately 20 miles northeast of the Reservation. Both Deseret Chemical Depot and Tooele Army Depot are located on the east side of the Onaqui and Stansbury Mountain ranges. The Envirocare Mixed Waste Storage Facility is located northwest of the Reservation (Item 22 on attached map) at a distance of approximately 25 miles. The APTUS Hazardous Waste In-

[2] The map at Exhibit 2 is Map 4-1 Sensitive Receptors Used In Air Quality Modeling from U. S. Department of the Interior. 1990. *Final Environmental Impact Statement; USPCI Clive Incineration Facility.* Tooele County, Utah. Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah. February. Page 4-79.

cinerator is also located northwest of the Reservation (Item 23 on attached map) at a distance of approximately 25 miles. Grassy Mountain Hazardous Waste Landfill is located to the northwest also (Item 27 on attached map) at a distance of approximately 37 miles. The PFSF is located on the Skull Valley Goshute Reservation. The facility is approximately 2.5 miles from the nearest residence.

22. I have assessed the pathways by which hazardous materials used, stored or disposed at the facilities listed in the contention might impact the Skull Valley Goshute Reservation and have concluded the air pathway is the only pathway that represents a conceivable threat to cause cumulative effects at the Reservation. This conclusion is based on the distances the listed facilities are from the Reservation, the geology, geography, topography, and climate of Skull Valley and surrounding areas. *See* Declaration of George Liang (groundwater contamination is not a potential source of cumulative impacts).

23. One of the key factors to be considered in evaluating air quality impacts is the prevailing wind direction. Examination of wind rose diagrams for the region of Skull Valley (Exhibits 3[3] and 4[4] to this declaration[5]) reveal that the prevailing winds are either northerly or southerly. The wind blows only a small percentage of the time from either the east or west. This would generally mean that Dugway and Deseret Chemical Depot would be potential contaminant sources when the wind is from the southerly direction and APTUS, Grassy Mountain, and Envirocare would be potential contaminant sources

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[3] Exhibit 3 is from the U. S. Department of the Interior. 1990. *Final Environmental Impact Statement; USPCI Clive Incineration Facility.* Tooele County, Utah. Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah. February. Figure 3-1, page 3-6

[4] Exhibit 4 is from the U.S. Nuclear Regulatory Commission. 2000. *Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation of the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah.* Docket No. 72-22, Private Fuel Storage, L.L.C., Figure 3-5, page 3-16.

[5] See also wind rose diagram from U.S. Department of the Army (Army). 1989. "Disposal of Chemical Agents and Munitions Stored at Tooele Army Depot, Tooele, Utah: *Final Environmental Impact Statement,* Program Manager for Chemical Demilitarization. Aberdeen Proving Ground, MD, Figure 4-1.

when the wind is from the northerly direction. Since Tooele Army Depot is basically due east of the Skull Valley Goshute Reservation, there would be little chance for airborne contaminants to be transported to the Reservation.

24. Examining the potential of the three OGD facilities located to the North of the PFSF for creating an air quality impact on the Skull Valley Reservation, only APTUS represents a significant source of air pollutants because of the nature of incineration operations. Because Grassy Mountain and Envirocare are both land burial facilities they do not represent significant sources of air pollutants.

25. The APTUS incinerator represents the greatest potential source of airborne pollutants that could create cumulative impacts on the Skull Valley Goshute Reservation. To evaluate potential impacts the Environmental Impact Statement for that facility[6] was examined. APTUS incinerator emissions were evaluated against the National Ambient Air Quality Standards published by EPA. These standards are as follows:

Pollutant	Averaging Time	NAAQS[7] ($\mu g/m^3$)
Particulate (PM-10)	24-hour	150
	Annual	50
Sulfur dioxide (NO_2)	3-hour	1,300
	24-hour	365
	Annual	80
Nitrogen dioxide (NO_2)	Annual	100
Carbon monoxide (CO)	1-hour	40,000
	8-hour	10,000
Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)

[6] U.S. Department of the Interior. 1988. Draft Environmental Impact Statement, APTUS Industrial and Hazardous Waste Treatment Facility, Tooele County, Utah. Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah. February. The APTUS Final EIS incorporated the entire DEIS by reference.

[7] NAAQS have not changed since 1988 when the APTUS DEIS was published.

Ozone (O_3)	1-hour	235
Lead (Pb)	Quarter	1.5

26. Also reported were significance levels for toxic contaminants in ambient air, which the EIS extracted from a variety of sources. The significance levels were selected based on the most stringent guidelines used by states as published by EPA,[8] EPA guidance on risk specific doses for carcinogens, or adaptation of exposure standards published by the American Conference of Governmental Industrial Hygienists (ACGIH). When ACGIH Threshold Limit Values or Short-Term Exposure Limits were used to define acceptable levels of ambient air exposure to non-criteria pollutants, safety factors were incorporated to determine the significance levels used in the EIS. In this EIS, a safety factor of 100 was used for most compounds while a safety factor of 1,000 was used for compounds that are known or suspected carcinogens. The significance levels contained in Table 4-2 of the APTUS EIS are as follows:

Pollutant	Averaging Time	Significance Concentration ($\mu g/m^3$)
PCBs	8-hour	0.024
	Annual	0.002
Dioxins/Furans (i.e., TCDD-2,3,7,8)	Annual	$4x10^{-8}$
Chlorine	1-hour	30.0
	8-hour	15.0
	Annual	7.14
Beryllium	8-hour	0.002
Phosgene	8-hour	4.0
	Annual	1.3
Pollutant	Averaging Time	Significance Concentration

[8] Environmental Protection Agency, 1987. National Air Toxics Information Clearinghouse: NATICH data base report on State, Local, and EPA air toxics activities. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. EPA-450/5-87-006.

		($\mu g/m^3$)
Hydrogen Chloride	1-hour	2000.0
(HCl)	8-hour	70.0

27. The estimates of incinerator emissions were based on parameters required for permits to incinerate TSCA and RCA wastes. Some of the key criteria for TSCA include a 99.9999% destruction and removal efficiency, 2-second dwell time at 1200°C with a 3 percent excess oxygen or a 1.5-second dwell time at 1600°C and 2 percent excess oxygen, and a combustion efficiency of 99.99% or greater. For RCRA wastes, the following standards must be met:

- At least 99.99% destruction and removal efficiency for the principal organic hazardous constituent in the waste feed with the exception of dioxins and furans which require a 99.9999% destruction and removal efficiency;
- At least 99% removal of hydrogen chloride or 1.8kg/hour (whichever is larger) from the exhaust gas;
- Particulate emissions not exceeding 0.08 grains/dry standard cubic foot corrected to 7% oxygen in the stack gas

28. APTUS air quality impacts were evaluated from two vantage points. One was to calculate the maximum air quality impacts and the second was to evaluate the air quality impacts at selected sensitive receptors, one of which was the Skull Valley Band of Goshute Reservation. The maximum air quality impacts were not considered applicable to evaluation of cumulative impacts on the Skull Valley Reservation because the maximum impacts occur no further from the stack than 2.0 kilometers. Moreover, even at the maximum impact location, the emissions did not exceed the NAAQS or significance concentration. The emissions presented in Table 4-6 of the EIS below represent concentrations of pollutants expected under normal operating conditions.

Table 4-6[9]

AIR QUALITY CONCENTRATIONS AT SKULL VALLEY RESERVATION ARISING FROM APTUS INCINERATOR ($\mu g/m^3$)

Period	Hydrogen Chloride		Chlorine			PCBs		Dioxins/ Furans	Phosgene		Beryllium
	1-hour	8-hour	1-hour	8-hour	Annual	8-hour	Annual	Annual	8-hour	Annual	8-hour
Significance Concentration	2000	70	30	15	7.14	2.4E-02	2.0E-03	4.0E-08	4.0	1.3	2.0E-03
Skull Valley Reservation Concentration	4.3	1.81	0.44	0.19	1.59E-03	3.84E-04	3.28E-06	7.23E-11	1.13E-02	9.65E-05	7.29E-05

[9] APTUS EIS, supra note 6.

Examination of the modeled emissions predicted to reach the Skull Valley Reservation indicates that the concentrations of all of the listed constituents are at least 20 times below the significance concentrations.

29. The overall performance of the APTUS incinerator to date can be evaluated by comparing the relative production of pollutants reported in the annual air quality reports compiled by the Utah Department of Environmental Quality with the EIS estimated incinerator emissions.[10] This evaluation does not allow a complete evaluation of performance, as not all of the pollutants are listed in the UDEQ reports, but does provide an indication of the overall level of emissions. The comparison is made assuming 8,000 hours of operation of the incinerator on an annual basis. This number of hours was selected because it was used in the APTUS EIS for an evaluation of the contribution of the APTUS emissions to the overall chlorine and hydrogen chloride concentrations in the region. The results in tons per year are as follows:

Pollutant	EIS Calculated Emissions	Actual Emissions 1993	1994	1995	1996	1997	1998
Carbon Monoxide	76	2.46	5.88	7.81	8.39	10.28	19.09
NOx	280	63.8	65.09	78.52	90.14	104.64	101.58
PM10	64		2.14	2.28	2.43	3.15	2.64
SOx	132	8.58	9.43	2.33	3.26	2.50	2.40

30. This data indicates that the emissions from the APTUS incinerator have been well below the emissions estimated in the EIS (substantially less than half and in several cases less than 10 percent of the EIS values). This suggests that the results of the EIS air quality impact analysis are conservative. Even with the apparent conservatism, the APTUS EIS concluded that the incinerator would have no significant impacts to air

quality because concentrations of criteria pollutants would be below NAAQS and concentrations of toxic contaminants would not exceed acceptable concentration levels.

31. Furthermore, the performance of the APTUS incinerator against permit requirements was evaluated in a 1998 Performance Test. The results of the testing were approved by both the Utah Department of Environmental Quality and the Environmental Protection Agency. As reported in the Performance Test Report[11] all emissions measured in the performance were well below the permit requirements. Table 1-1 of the report provides a performance summary. The performance test results reflected in the Table indicate that the APTUS incinerator's performance is better than the permit requirements for all parameters.

Footnote continued from previous page

[10] Table 4-3, APTUS EIS, supra note 6.

[11] SAFETY-KLEEN (ARAGONITE), Performance Test Report, Prepared by Radian International, 8501 North Mopac Blvd., P.O. Box 201088, Austin, Texas 78720-1088 for SAFETY-KLEEN (ARAGONITE), 11600 North APTUS Road, Aragonite, Utah 84029, October 28, 1998

Table 1-1 Performance Test Report

Parameter	Permit Requirement	Performance Test Result
RCRA Permit		
Destruction & Removal Efficiency (%) Hexachloroethane Monochlorobenzene Polychloronated Biphenyls	 99.99 99.99 99.99	 >99.999989 >99.999982 >99.999992
Hydrogen Chloride Emissions (lbs/hr)	4	0.0065
Carbon Monoxide Concentration (ppmv, corrected to 7% oxygen	100	1.5
Metals Emissions (lbs/hr) Antimony Arsenic Barium Beryllium Cadmium Hexavalent Chromium Lead Mercury Silver Thallium	 6.64 0.0244 150 0.0023 0.0049 0.00845 1.99 1.77 5 5	 <0.000059 <0.000035 <0.000287 0.0000122 <0.000015 0.000079 <0.0002 0.0201 0.000696 <0.00015
Air Permit		
PM-10 (grains/dscf)	0.016	0.00025
PM-10 (lbs/hr)	3.68	0.064
Copper (lbs/hr)	16.87	0.000272
Manganese (lbs/hr)	8.43	0.010
TSCA Permit		
PCB Emissions (grams per Kg feed)	0.001	<0.000080
PCB Destruction % Removal Efficiency (%)	99.9999	>99.999992
Combustion Efficiency (%)	99.99	99.999

32. In addition, the performance test results provide further evidence that the estimates of emissions contained in the APTUS EIS are conservative. This can be seen when estimated incinerator emission rates contained in Table 4-3 of the APTUS EIS are compared to emission rates measured in the performance test.

Comparison of Estimated Emissions to Performance Test Results

Pollutant	EIS Estimates (lbs/hr)	Performance Test Results (lbs/hr)
Polychlorinated biphenyls	0.0068 (TSCA feed)	0.000028
Hydrogen chloride	32.0 (TSCA feed)	0.0065
Chlorine	3.3 (TSCA feed)	0.00314
Particulates	16.0	0.064
Dioxins[12]	8.1×10^{-8}	3.935×10^{-9}
Furans[11]	1.8×10^{-6}	2.64×10^{-8}
Beryllium	1.3×10^{-3}	1.22×10^{-5}

As can be seen the measured emission rates are all at least 10 times lower than the estimated incinerator emission rates that were used as inputs for the modeling of air quality at the sensitive receptor sites, including the Reservation.

33. The APTUS EIS does not address accident scenarios other than spills associated with transportation accidents. The transportation accidents described would not have an effect on the Skull Valley Reservation because the hazard distances are a few thousand feet. The APTUS EIS does address upset conditions. It describes a worst case upset as loss of power with the kiln full of solid waste. Should this occur, an emergency

[12] Values were converted to equivalents of 2,3,7,8-Tetrachlorobenzodioxin

vent downstream of the afterburner chamber would open for 5 minutes, releasing all pollutants. However, flow of auxiliary fuel to the afterburner chamber would continue thereby destroying organics in the kiln. Therefore, there would be no increase in emissions of PCBs, dioxins, furans, or POHCs during the upset. There would be an initial increase in particulate, HCl and Cl_2 emissions as control devices for these pollutants are by passed. Because all waste feeds are shut off, the rates of emissions will decrease. The rate of decrease was not identified.

34. I also examined the evaluation of cumulative air quality impacts contained in the "Final Environmental Impact Statement to Construct and Operate a Facility to Receive, Store, and Dispose of 11e.(2) Byproduct Material Near Clive, Utah", Docket No. 40-8989, Envirocare of Utah, Inc, U.S. Nuclear Regulatory Commission, August, 1993. In their evaluation of cumulative impacts, five nearby waste facilities that may contribute to a cumulative impact with the addition of the Envirocare 11e (2) facility were evaluated. The five waste facilities evaluated were (1) Envirocare's existing low-activity and mixed waste disposal facility, (2) uranium mill tailings from the DOE Vitro remediation project, (3) USPCI's hazardous waste incinerator (i.e., the Clive incinerator), (4) USPCI's Grassy Mountain hazardous waste landfill, and (5) APTUS Inc's hazardous waste incinerator. The location of these facilities is shown on Map 4-1 (Exhibit 2). It was concluded that the proposed action, i.e., construction and operation of the Envirocare 11e.(2) facility, would have no cumulative impacts with the hazardous waste incinerators and landfill facilities listed above, which are all located 25 miles or more from the PFSF site. Therefore, I conclude that Envirocare would cause no significant cumulative air quality impact on the Skull Valley Goshute Reservation. This assessment further supports the assessment based on the APTUS incinerator EIS that the hazardous waste facilities north of the PFSF site - Envirocare, APTUS, and Grassy Mountain - will create no significant air quality impact at the PFSF site.

35. I was unable to find any specific documentation that addresses the air quality impacts of the Grassy Mountain Hazardous Waste Landfill. However, the type of

operations conducted at the landfill and the distance the landfill is from the Reservation, make it extremely unlikely that landfill operations would impact the air quality at the Reservation. The mission of the facility is to provide land burial for permitted wastes. The Grassy mountain facility accepts hazardous wastes waste as described in the TSCA and RCRA permits. The TSCA permit allows for the disposal of non-liquid polychlorinated biphenyl (PCB) in any of three designated chemical landfills. The RCRA/HSWA permits allow for the storage, treatment, and disposal of certain classes of hazardous wastes. As the RCRA permit[13] does not contain criteria related to air quality except for dust control, a toxic air quality impact is not expected. Also due to the nature of the disposal operations, land burial, an accident at the disposal facility would not be expected to have a significant impact on the Reservation.

36. To provide additional information on the cumulative air quality impacts on OGD and the Skull Valley Goshutes with respect to the OGD facilities located to the North of the Reservation, I reviewed "Final Environmental Impact Statement, USPCI Clive Incineration Facility", Tooele County Utah, U.S. Department of the Interior, Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah, February 1990. The Clive Incinerator, which is now idle and is being closed, is located approximately 25 miles northwest of the PFS site.

37. The cumulative air quality impact analysis presented in the EIS explicitly included emissions from USPCI, APTUS, the Envirocare facility for Vitro tailings disposal near Clive, and the Amax facility at Rowley. APTUS was considered the most likely source for cumulative effects with the Clive incinerator as they are both commercial incinerators and have the same kind of emissions. The Envirocare Vitro tailings disposal site was included in the cumulative effects analysis only for particulate emissions as this is the only type of air emissions that were expected to be similar to the Clive incinerator. The Amax facility, a large source of chlorine and hydrogen chloride emissions,

[13] USPCI, Grassy Mountain, *Revised RCRA Permit*, April 15, 1996. Utah Department of Environmental Quality, Division of Solid and Hazardous Waste InternetWeb Site.

was included only for the analysis of hydrogen chloride impacts at the worst case impact location for the Clive/APTUS combination. For the analysis of sensitive receptor sites, air pollutant concentrations represent the incremental increase over existing concentrations due to Clive and APTUS incinerators. Since the Clive incinerator is no longer operating, this analysis provides a conservative bounding analysis.

38. The results of the cumulative air quality analysis presented in table 4-12, "Air Quality Concentrations at Sensitive Receptors: Clive Alternative ($\mu g/m^3$) - All Sources", page 4-73 includes the Skull Valley Reservation as one of the sensitive receptors identified. An extract of Table 4-12, following, indicates that the cumulative level at the Reservation of all modeled concentrations falls at least 10 times below (and on annual basis at least 40 times below) below the significance levels for toxic contaminants in ambient air. These results are corroborated in the screening level risk assessment for the USPCI Clive Incineration Facility.[14] The risk assessment evaluated the excess lifetime cancer risk for three receptor locations. The nearest residence is considered to be the most representative in evaluating the risk to inhabitants of the Skull Valley Reservation. The nearest resident is assumed to live in Iosepa which is about 8 miles closer to the site of the Clive incinerator than the Reservation. The risk assessment estimates that the excess lifetime cancer risks for the nearest residents ranges from $9x10^{-7}$ for the subsistence farmer to $4x10^{-8}$ for a resident child. These risk levels are well below the EPA benchmark of acceptability of $1x10^{-5}$ and because of the distance between Iosepa and the reservation represents a very conservative assessment of the risk.

[14] ENVIRON Corporation. 1995. *Screening-Level Risk Assessment.* ENVIRON Corporation, Princeton, New Jersey. August, 1995.

Table 4-12[15]

CUMULATIVE AIR QUALITY CONCENTRATIONS AT SKULL VALLEY RESERVTION(μg/m³) - FROM CLIVE EIS[16]

	Hydrogen Chloride		Chlorine		PCBs		Dioxans/ Furans	Pentachlorophenol	Carcenogenic Metals
Period	1-hour	Annual	1-hour	8-hour	8-hour	Annual	Annual	8-hour	Annual
Significance Concentr ation	70		15	15	0.024	0.002	4E-08	5	0.002
Skull Valley Reservation Concentration	3.3	0.011	1.4	0.34	1.1E-04	1.8E-06	4.0E-11	0.02	1.3E-06

39. As stated in the Clive EIS, the significance criteria for airborne pollutants evaluated were established at levels that represent the lowest concentration levels at which adverse health or ecological effects from exposure to air pollution are known or suspected to occur. For criteria pollutants, these levels are those established by law in the National Ambient Air Quality Standards. The criteria pollutants are particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, and lead. Pollutants not regulated by the NAAQS are referred to as non-criteria pollutants. The significance levels for non-criteria pollutants were taken from EPA Reference Air Concentrations for select non-carcinogenic compounds, unit risk concentrations for carcinogenic compounds established by EPA's Carcinogen Assessment Group, and threshold limit values (TLV) and short-term exposure limits published by the American Conference of Governmental Industrial Hygienists. When TLVs or STELs were used as the basis for the significance

[15] U. S. Department of the Interior. 1990. *Final Environmental Impact Statement: USPCI Incinerator Facility, Tooele, Country, Utah.* Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah. February.

[16] It should be noted that Clive EIS Table 4-12 values for significance concentrations do not reflect the same values as Clive EIS Table 4-9. Table 4-9 indicates that the 1-hour and annual significance concentrations for hydrogen chloride are 150 and 7 respectively and the 1-hour and 8-hour values for chlorine are 30 and 15 respectively. Regardless which of the significance concentration values (Table 4-12 or 4-9) are taken, the modeled values of the cumulative concentrations of air toxics at the Skull Valley Reservation are well below the significance concentration values.

levels, safety factors were applied. For non-carcinogenic compounds a safety factor of 100 was used. For known or suspected carcinogens a safety factor of 1,000 was used.

40. Therefore, given the foregoing, APTUS and the other OGD facilities north of the PFSF would create no significant cumulative impacts at the Skull Valley Reservation.

41. Next, I evaluated potential impacts from Tooele Army Depot. In evaluating the potential air quality impacts from Tooele Army Depot, the current missions of the Depot must be kept in mind. The activities being conducted at the depot are discussed in paragraphs 12 and 13. The only major mission activity currently being conducted is the storage, maintenance, and disposal of conventional ammunition. Of these, the only potential source of air emissions would be the disposal of conventional ammunition.

42. To evaluate the potential for Tooele Army Depot to impact of the Reservation, I evaluated a site-wide ecological risk assessment prepared for the U. S. Army [17] This risk assessment evaluated the ecological risk caused by 56 solid waste management units (SWMUs). The risk assessment reported that a review of a limited amount of air modeling data for volatile organic compounds for the seven SWMUs of potential concern indicated that the hazard quotients were so low that the inhalation pathway was not added to the soil, surface water, or dietary ingestion pathways. Most of the solid waste management units identified in the risk assessment are related to missions no longer performed at the depot. The risk assessment stated:

> Based upon the assessment of the analytical and biometric data, and evaluation of the final risk calculations, most locations at [Tooele Army Depot] do not present a significant ecological risk to the birds and mammals that reside at or utilize the facility. The biometric data (i.e., habitat structure, population abundance and diversity)

[17] Rust Environment and Infrastructure (1997). *Tooele Army Depot: Revised Final Site-Wide Ecological Risk Assessment, Vol I.* Prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD. Grand Junction, CO. November.

> showed a strong association with the physical disturbance and support the conclusion that the assessment endpoints are not being measurably impacted by chemical contamination at most [Tooele Army Depot] locations. Only seven SWMUs indicate the potential for unacceptable or excessive ecological risks.[18]

43. Of the seven SWMUs listed above as having the potential for unacceptable or excessive ecological risks, only one would appear to be a source for air contamination. That site is SWMU 1/1d Open Burn/Open Detonation, which supports the remaining ammunition mission, i.e., disposal of conventional munitions, at the depot. Open burning/Open detonation is a process that is used to dispose of unwanted residual munitions and propellants, explosives, and pyrotechnics. In the disposal process the materials to be destroyed are burned or detonated in the open, i.e., no pollution abatement equipment is used. While there is no specific data available on the operating constraints for the use of the open burn/open detonation site, it does operate under interim permit status (RCRA Part A has been submitted to the Utah Department of Environmental Quality). However, due to the separation distance between the depot and the reservation and the intervening mountain range, it is highly unlikely that the Skull Valley Reservation would be adversely impacted by open burning/open detonation operations. Because only conventional not chemical munitions are disposed by open burning/open detonation at Tooele, it is reasonable to conclude that Tooele Army Depot would cause no significant cumulative air quality impact at the Skull Valley Reservation. Due to the nature of the operations at Tooele Army Depot, this conclusion is valid for both normal and accident conditions.

44. I evaluated the potential risks that the Deseret Chemical Depot might pose to the Skull Valley Goshute Reservation by examining risk analyses for the chemical weapons incinerator facility. No specific analysis has been performed with the Reservation as a specific receptor site, but a screening level risk prepared for the State of Utah

[18] Ibid

Department of Environmental Quality,[19] identified a receptor that can serve as the basis for evaluating risks to the Reservation. This receptor site is located at a similar direction and distance from the Desert Chemical Depot. The Reservation is, however, located on the opposite side of the Stansbury Mountains. The mountains would have a significant effect on the transport of hazardous substances from the Deseret Chemical Depot by greatly reducing their movement and causing mixing that would reduce concentrations of airborne pollutants. The receptor chosen from the screening risk assessment is a fish farmer located 25 miles to the north-northwest of the Tooele Chemical Demilitarization Facility. The fish farmer was assumed to be an adult who was exposed to emissions impacts for 350 days per year for 30 years, regularly ate fish caught in water impacted by incinerator emissions and grew 25% of the vegetables he consumed in soils impacted by incinerator emissions. While the lifestyle of the fish farmer is not the same as the residents of the Skull Valley Reservation, given the lengthy period of assumed residence during the year and the assumed ingestion of substantial quantities of locally grown subsistence, the risk assessment of the fish farmer can reasonably be used as a conservative upper bound of the risk for the Reservation. This is particularly true given that the fish farmer was assumed to be located on the near side of the Stansbury Mountains to the incinerator whereas the Reservation is on the far side of the Stansbury Mountains.

45. The risk assessment assumed operation of the incinerator for periods of 10, 15, and 30 years. To provide the most conservative evaluation, the risk assessment assumed that both the Tooele Chemical Demilitarization Facility (TOCDF) and the CAMDS (Chemical Agent and Munition Disposal System) had all chemical incinerator units operating simultaneously. The results of this assessment revealed that for all operating periods, the overall cancer incidence risk was $7x10^{-8}$ for the worst case, a 30 year operating period. This is the estimated risk of the conservatively assumed fish farmer

[19] Tooele Chemical Demilitarization Facility, Tooele Army Depot South, EPA I.D. UT5210090002, "Screening Risk Assessment", prepared for: State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, 288 North 1460 West, P.O. Box 144880, Salt Lake, Utah 84116-4880, pre-

Footnote continued on next page

described above. Thus the human health risks associated with exposure to maximum emissions from TOCDF plus CAMDS were several orders of magnitude below the $1x10^{-5}$ risk level criterion provided in EPA guidance.[20] Further, none of the receptors evaluated in the risk assessment were exposed to a cancer risk greater than the EPA guidance even though they were located within 4 miles of the Tooele Army Depot-South boundary.

46. I also evaluated the accident risk posed by the TOCDF to the Skull Valley Reservation. As reported by the National Research Council,[21] the probability of exceeding one public acute fatality caused by an accident during 7.1 years of disposal operations at the TOCDF at a distance of 35 to 50 kilometers is $9x10^{-8}$. The distance from the TOCDF to the Skull Valley Goshute Indian Reservation falls within this range. The risk to individuals residing at the Reservation would be reduced because of the impact of the Stansbury Mountains on movement of the agent cloud. This public risk is dominated by a seismic initiation of chemical agent release. In the absence of an earthquake-initiated release, the mean fatality risk to the public would be 40-fold less. This is an insignificant public safety risk when one considers that the NRC accepts a risk of 10^{-5} per reactor per year of a large early release of radioactive material in a reactor accident. *See* Modifications to the Reactor Safety Goal Policy Statement, SECY-00-77 (Mar. 20, 2000), approved by Staff Requirements Memorandum (June 27, 2000).

47. I have found no evidence that Dugway Proving Ground activities produce any hazardous waste emissions that would impact on the Skull Valley Goshute Reservation. This assessment is based on the following.

Footnote continued from previous page

pared by: A.T. Kearney, Inc., 101 California Street, 16th Floor, San Francisco, California 94111, February 1996.

[20] U.S. Environmental Protection Agency (EPA), (Draft) *Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities.* Office of Solid Waste. EPA 530/R-94/021. April, 1994

[21] National Academy Press, Risk Assessment and Management at Deseret Chemical Depot and the Tooele Chemical Agent Disposal Facility. Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program, Board on Army Science and Technology, Commission on Engineering and Technical Systems, National Research Council. (1997) Washington, D.C.

48. There is no firing of live chemical munitions (where "chemical munition" is defined as a munition that has a chemical agent filling) or open air testing or use of chemical agent. Under 50 U.S.C. § 1512, there has been no open air use of chemical munitions or agent at DPG since 1969. Moreover, further constraints on the development and testing of chemical munitions were applied when the United States Senate ratified the Chemical Weapons Convention on April 24, 1997. Under that treaty, the United States will conduct no testing of chemical munitions intended to be filled with chemical agents. Therefore, there will be no open air use of chemical munitions or agents at DPG that could have a cumulative impact on OGD or the Skull Valley Goshute Reservation.

49. In its contention, OGD refers to a 1968 incident in which an airplane that was spraying nerve agent VX malfunctioned and apparently caused the death of sheep outside the boundaries of DPG, including on the Skull Valley reservation. This incident, however, could no longer happen given the prohibition on open air testing of chemical munitions and agent. OGD also suggests in its contention that reservation land may still be contaminated from this incident. Because of the time period involved between the 1968 incident and today, any nerve agent VX that may have been deposited in the vicinity of the Goshute Reservation, would have long since decomposed as VX at pH 7 has a half-life of 5,000 hours (~7 months). At an alkaline pH, the rate of decomposition is more rapid.

50. Testing in support of chemical defense programs is conducted at DPG in laboratories using chemical agents. The agents are used to test the effectiveness of chemical protective clothing and equipment, the sensitivity of detection equipment, the resistance of materials to the effects of chemical agents, and the effectiveness of equipment and processes for the destruction of chemical munitions and agents. This testing is conducted only in facilities specially designed to prevent the release of chemical agents to the environment. These facilities include the Combined Chemical Test Facility (CCTF), the Material Test Facility (MTF) and the Defensive Test Chamber (DTF) described earlier. This indoor testing involving chemical agents at DPG would not pose a

credible hazard to the OGD or Skull Valley Goshute Reservation because of the extensive safety precautions taken during testing and the distances of the test facilities from the Reservation, approximately 15 miles. The testing that takes place in laboratories at DPG is performed in facilities specially designed to preclude the release of chemical agent to the atmosphere. These include maintaining test areas at negative pressure, so any leakage of air will be into and not out of the test area, and the provision of carbon filtration of air cycled through test areas to remove any agent.

51. DPG does not have as a part of its mission the storage of stockpile chemical agents and munitions, but it does store chemical munitions that had been fired (but did not explode) or buried on the ranges prior to 1969 that have been recovered from those firing ranges or disposal sites. It also stores chemical agents that have been removed from the munitions and which are awaiting disposal and it stores agents that are used in the chemical tests discussed above. The chemical munitions and the chemical agent removed from munitions are stored in Igloo G under an interim RCRA Permit issued by the State of Utah. Chemical agents used in laboratory testing are also stored in Igloo G and some agent may also be stored in the CCTF and MTF testing laboratories. Igloo G is located more than 15 miles from the Skull Valley Goshute Reservation. Chemical munitions and agents stored at DPG would not pose a hazard to the Reservation because of the quantities of agent maintained, the storage configuration, distance to the reservation, and safety requirements established by the Department of Defense and the Utah Department of Environmental Quality.

52. Special measures are taken to reduce the hazards that the disposal of chemical munitions or agents would pose to people on or off range. As all chemical munitions recovered from the DPG ranges are classified as RCRA hazardous wastes, they must be disposed of in accordance with permits issued by the Utah Division of Solid and Hazardous Wastes. When munitions found on the range are destroyed in place because they are considered unsafe to move, the quantity of explosives used is calculated to provide an excess of heat to destroy the agent. In such cases, air samples are taken to deter-

mine whether any agent survived the explosion of the munition. I am aware of no sampling results that indicated the presence of chemical agent in the air after a munition was destroyed. Normal disposal of chemical agent used in testing is conducted in enclosures designed to contain any agent that might otherwise escape. In disposal, the agent is chemically neutralized on site so that it does not pose a risk to people on or off range. The disposal of chemical munitions or agents at Dugway would not have a cumulative impact on or pose a credible hazard to the Skull Valley Goshute Reservation.

53. Activities at DPG involving biological defense include biological materials testing and storage and disposal incident to that testing. In general, testing is conducted to determine the effectiveness of various biological detectors and protective equipment against the various biological materials (bacteria, viruses, and toxins) being used to challenge the equipment. There are, however, no biological munitions or biological warfare agents at DPG; the United States destroyed all of its biological munitions and biological agents following a Presidential decree in 1969. Specifically, a "biological munition" is defined as a munition that was filled with a biological warfare agent that would have been disseminated explosively or sprayed out under pressure. A "biological agent" is defined as those biological materials (bacteria, viruses, and toxins) that the U. S. Army had selected for development as part of a weapons system, to be used in time of war against enemy forces, and which may or may not have been placed in a biological munition. The nomenclature "biological materials" is used to distinguish biological warfare agents, as defined above, from the bacteria, viruses, and toxins that are currently used at DPG for defensive testing of detection and protection systems.

54. All biological defense activities at DPG take place in the Life Sciences Test Facility, located near Baker area on DPG more than 20 miles from the Skull Valley Goshute Reservation. The types of biological materials used in testing at the Life Sciences Test Facility include bacteria and viruses, both infectious and non-infectious, and toxins up to Biosafety Level III (which are biological materials with a potential for lethal infection and for respiratory transmission but for which a vaccine or treatment exists).

DPG also stores biological materials prior to the tests it conducts and destroys any unwanted material after the tests are completed. The quantities stored are those required for the specific tests being conducted. The entire biological test program at DPG, including the types of biological materials to be used in the program, is under the oversight of the Utah Governor's Technical Review Committee.

55. Special measures are taken to reduce the hazards that the use of biological materials would pose to people on or off range. The entire approach to the design of a biological containment facility is to reduce the hazard to the work force at the facility and the public. Specific measures are governed by the specific characteristics of each material used. The containment systems used to prevent the material from escaping to the environment are determined by the level of hazard posed by the material. At the Life Sciences Test Facility, these features include maintaining the test areas at negative pressure and filtration of air cycled through test areas. The requirements for the storage and handling of biological materials in the laboratory are prescribed in Army Regulation 385-69, Biological Defense Safety Program, and Department of the Army Pamphlet 385-69, Biological Defense Safety Program. These requirements are designed to ensure that the materials are controlled and not released to the environment. The Life Sciences Test facility provides containment up through Biosafety Level III, which provides more than adequate protection for the materials employed in testing at DPG. The design and procedural controls applied to a Biosafety Level III facility allow such facilities to be located in populated areas. The Life Sciences Test Facility, however, is located over 20 miles from the Reservation.

56. As part of the programs conducted at the Life Sciences Test Facility, biological materials are also disposed of at DPG. Department of the Army Pamphlet 385-69 provides guidance on methods that may be used to destroy biological materials, which are intended to ensure that such materials are disposed of in a safe manner and are not released to the environment. The disposal practices are the same as those used in biological

laboratories throughout the United States and would not have cumulative impact on or pose a hazard to the Reservation.

57. Furthermore, in the highly unlikely event that biological material used in the Life Sciences Test Facility at DPG were to escape into the environment, it would not pose a credible hazard to the Reservation. The Environmental Impact Statement for the Life Sciences Test Facility evaluated a scenario involving a release from the facility and showed that such material would have almost no chance of surviving in the environment long enough to be carried the 20 miles to the Reservation in the air.[22] Department of the Army, U.S. Army Dugway Proving Ground, Final Environmental Impact Statement: Life Sciences Test Facility, Volume II, Response to Comments (March 1992), at 3-55 to 3-57.

58. I am not aware of any accidents at Dugway involving the use of biological materials in which people on or off range were harmed by the materials. Because of the engineering and procedural controls that are employed to prevent the release of biological materials from the Life Sciences Test Facility and the distance separating the facility from the Reservation, the use of biological materials at DPG would not have a cumulative impact on or pose a credible hazard to the Reservation.

59. Dugway Proving Ground has 195 Solid Waste Management Units of which 31 are designated as Hazardous Waste Management Units. All of these units are managed in accordance with the Dugway RCRA Part B hazardous waste storage Permit, issued in 1994 by the Utah Department of Environmental Quality and revised in 1998. The Permit identifies the solid waste management units and hazardous waste management units and prescribes RCRA corrective action and clean-up requirements. Due to the nature of the solid waste management units and hazardous waste management units, controls required by the RCRA Part B Permit, and the distance between the waste manage-

[22] Department of the Army, U.S. Army Dugway Proving Ground, Final Environmental Impact Statement: Life Sciences Test Facility, Volume II, Response to Comments (March 1992), at 3-55 to 3-57

ment units and the Skull Valley Goshute Reservation, wastes at Dugway Proving Ground would not contribute to any cumulative impact on air quality at the Skull Valley Goshute Reservation.

There may be some PM-10 dust particles that may be transported to the Reservation from Dugway. This is conservatively evaluated in the Draft Environmental Impact Statement for the PFSF.[23]

D. Conclusion Regarding Cumulative Impact

60. Based on the foregoing analyses, the construction and operation of the PFSF together with emissions from Tooele Army Depot, Deseret Chemical Depot, Dugway Proving Ground, Envirocare Mixed Waste Storage Facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill would not create significant cumulative impacts at the Skull Valley Goshute Reservation. This conclusion was reached because the PFSF will not produce air pollutants in sufficient quantities to have an adverse cumulative impact on existing air quality. DEIS §§ 4.3.1, 4.3.2. All cumulative air quality assessments of existing facilities and operations indicate that concentrations of pollutants are well below established standards.

I declare under penalties of perjury that the foregoing is true and correct.

Executed on May 24, 2001.

George A. Carruth

[23] Draft *Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and Related Transportation Facility in Tooele County Utah,* Docket No 72-22, Private Fuel Storage, L.L.C., June 2000.

Carruth Declaration Exhibit 1

Resume

George A. Carruth

6435 Alloway Court
Springfield, VA 22152

Home: (703) 569-7884
Office: (202) 488-6736

CURRENT POSITION:
Manager, System Integration

EDUCATION:
Tulane University, 1967-1969, Biology, PhD, 1973
University of Arkansas, 1956-1957, Animal Nutrition, MS, 1957
University of Arkansas, 1952-1956, Agriculture, BS, 1956
National War College, 1978
U.S. Army Command and General Staff College, 1971-1972
U.S. Army Chemical School, Radiological Safety, 1964

EXPERIENCE:

CRWMS M&O

System Integration **1991 – Present**

Summary of Responsibilities and Major Accomplishments
Responsible for development, implementation and maintenance of CRWMS program-level management plans, policies and procedures; system level technical baseline requirements documentation and OCRWM and M&O change control plans and procedures. Manage the development of system interfaces and integrates engineering and other technical activities to ensure achievement of technical baseline.

TRW Command Support Division

Project Manager **1987 – 1991**

Summary of Responsibilities and Major Accomplishments
Developed organization and concepts for the TRW team system engineering, development and management of the Nuclear Waste Management System for the Office of Civilian Radioactive Waste Management. Managed and developed Business Management Volume of the TRW Proposal. Researched and prepared business analysis of environmental services for TRW entry into market. Developed strategy, and directed technical and management sections of TRW's proposal for Program and Integration Support of the Army's Chemical Stockpile Disposal Program.

U.S. Department of the Army

Chief, Chemical and Nuclear Biological and Chemical **1985 – 1987**
Defense Division, Office of the Deputy Chief of Staff for Operations and Plans

Summary of Responsibilities and Major Accomplishments
Developed and managed the Army's chemical warfare, nuclear, biological, and chemical defense policies, programs, and plans. Responsible for budget information and execution; doctrine; material requirement definition; and material life cycle management to include disposal of toxic chemical structure development; and material life cycle management to include disposal of toxic chemical munitions and agents. Maintained an annual program of $1 billion during period of severe budget reductions. Provided leadership for the development of the first Joint Service Chemical Warfare and Chemical Biological Defense Research

Development and Acquisition Plan that provides prioritized material, science and technology, and data requirements supporting resource needs to all the armed services. Guided development of the congressionally-mandated concept plan for the destruction of the national stockpile of toxic chemical agents and munitions on a very constrained schedule. Conducted and planned three program alternatives within average cost of $2 billion each. Briefed, and was a witness, before key congressional committees, members, and staffers on the Fiscal Year 1986 and 1987 Department of Defense Presidential Budget Requests. Gained congressional support/funding for the chemical warfare program including funding for production of binary chemical weapons.

Deputy Commander **1984 – 1985**
U.S. Army Nuclear and Chemical Agency

Summary of Responsibilities and Major Accomplishments
Provided daily direct supervision to the Army Nuclear and Chemical Agency, the only organization dedicated to provide technical support on nuclear and chemical matters to the Army in a tactical area. Provide top-level guidance on policy for the safety, security, and reliability of three of the Army's nuclear and chemical weapons. Supervised preparation of employment manuals for all Army weapons and those of other services used to support the Army in the field.

Commander **1981 – 1984**
Dugway Proving Ground

Summary of Responsibilities and Major Accomplishments
Managed the Army Dugway Proving Ground, DoD's only chemical warfare, chemical and biological defense and smoke major range and test facility. Planned, conducted, and reported on a wide variety of highly technical test projects representing over 45,000 man-hours of effort. Originated and guided to completion, a comprehensive plan for the modernization of the test facility to include increase in personnel and improved instrumentation, facilities, housing, utilities, and communications. Directly supervised the operation of an isolated 2,500-person community including housing, medical care, law enforcement, fire protection, utilities, and support facilities.

Chief, Nuclear and Chemical Office **1978 – 1981**
U.S. Army Material Development Readiness Command

Summary of Responsibilities and Major Accomplishments
Directed development of environmental documentation for several major Army programs to include controversial projects such as movement of chemical weapons for Colorado to Utah and the chemical stockpile program. Exercised major headquarters responsibility for the safety and the security of the majority of the Army Material Development and Readiness Command's chemical weapons and two of the largest nuclear depots to include responsibility for accident/incident control, physical security site-upgrade program, and personnel reliability program.

Staff Engineer **1975 – 1977**
Chemical Division, Office of the Deputy Chief of Staff
For Operations and Plans

Summary of Responsibilities and Major Accomplishments
Point of contact for all matters affecting nuclear, biological and chemical training, readiness, doctrine, equipment, and employment of chemical munitions for Headquarters, Department of the Army. Conducted joint service planning and coordination of program with Office of the Secretary of Defense and the other

Services. Lead team that conducted detailed review of the U.S. Army's Chemical Warfare Posture and developed a comprehensive program plan for correcting identified deficiencies.

As Chief of the Trails Branch Staff Studies and Trails Wing (1972 – 1974), served as Exchange Officer to the British Defense NBC School responsible for planning, coordinating, and directing tests of British NBC defense equipment and doctrine.

As Chief of the Radiological Division (1970 – 1971), presented nuclear weapons employment and radiology safety to all students at the U.S. Army Chemical School.

As Chemical Officer and Deputy Operations Officer (1969 – 1970), planned and operated the control room for monitoring and directing military operations in the largest corps area in Vietnam.

Executive for Plans and Training (1964 – 1967), for all U.S. Army forces in Panama.

Instructor for Plans and Training (1962 – 1964), for the U.S. Army Chemical School.

Instructor and Company Executive Officer (1960 – 1962), prepared and presented instruction to combined officer and enlisted courses on jungle and amphibious small unit operations for the Ranger Department in the U.S. Infantry School.

Research Biochemist (1957 – 1959), for the U.S. Army Biological Warfare Laboratory.

Awards/Accomplishments/Publications/Patents/Other

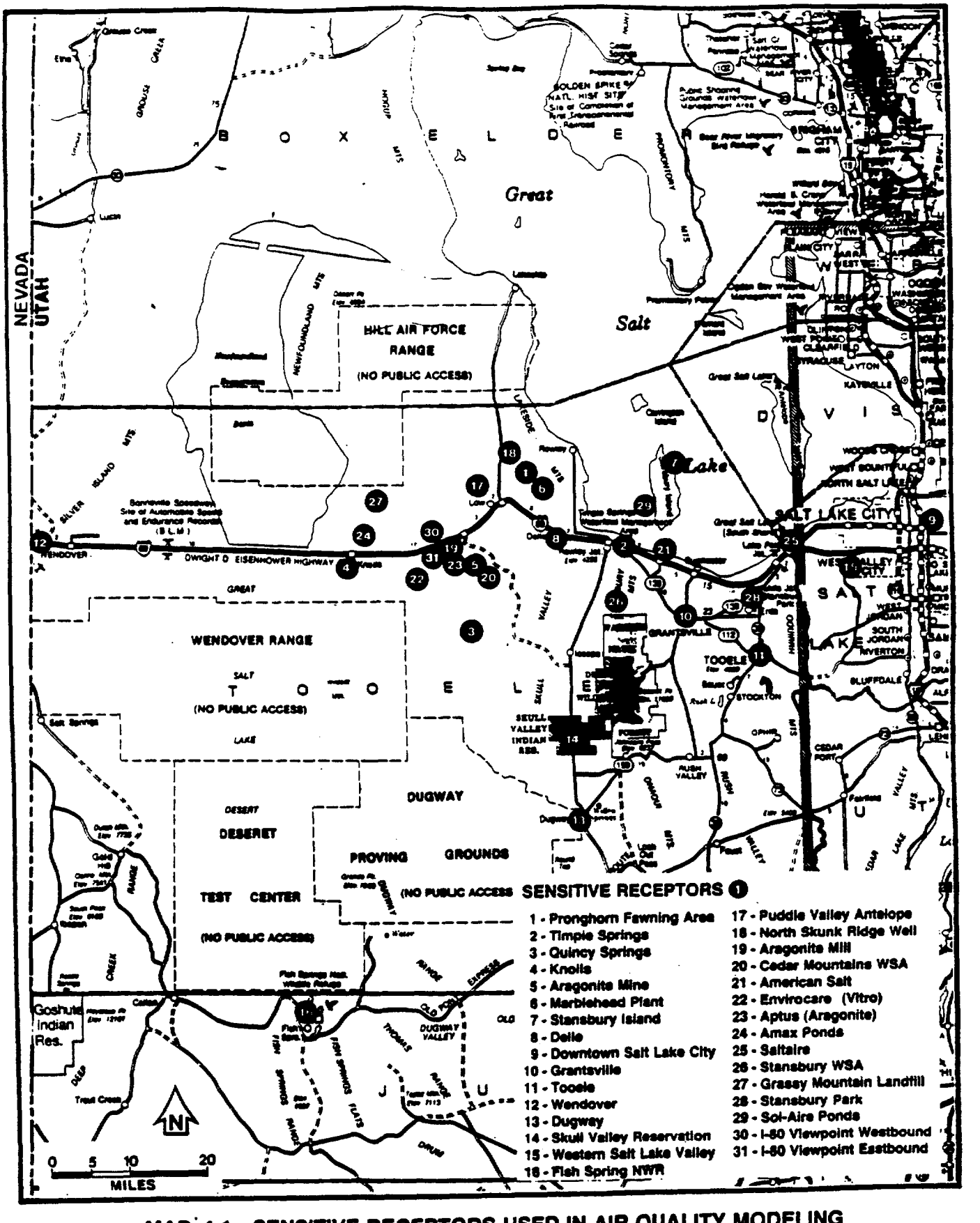
Memberships
National Science Foundation Fellowship (for MS)
National Science Fellowship (for PhD)
Sigma Xi

Awards
Legion of Merit (three awards)
Bronze Star
Army Commendation Metal (three awards)

Carruth Declaration Exhibit 2

Final Environmental Impact Statement; USPCI Clive Incineration Facility

Map 4-1: Sensitive Receptors Used in Air Quality Modeling



MAP 4-1 SENSITIVE RECEPTORS USED IN AIR QUALITY MODELING

UT 32922

Carruth Declaration Exhibit 3

Final Environmental Impact Statement; USPCI Clive Incineration Facility

Figure 3-1: Annual Wind Rose Newfoundland Site, Utah (January 1988-December 1988)

- ANNUAL WIND ROSE
NEWFOUNDLAND SITE, UTAH
(January 1988 - December 1988)

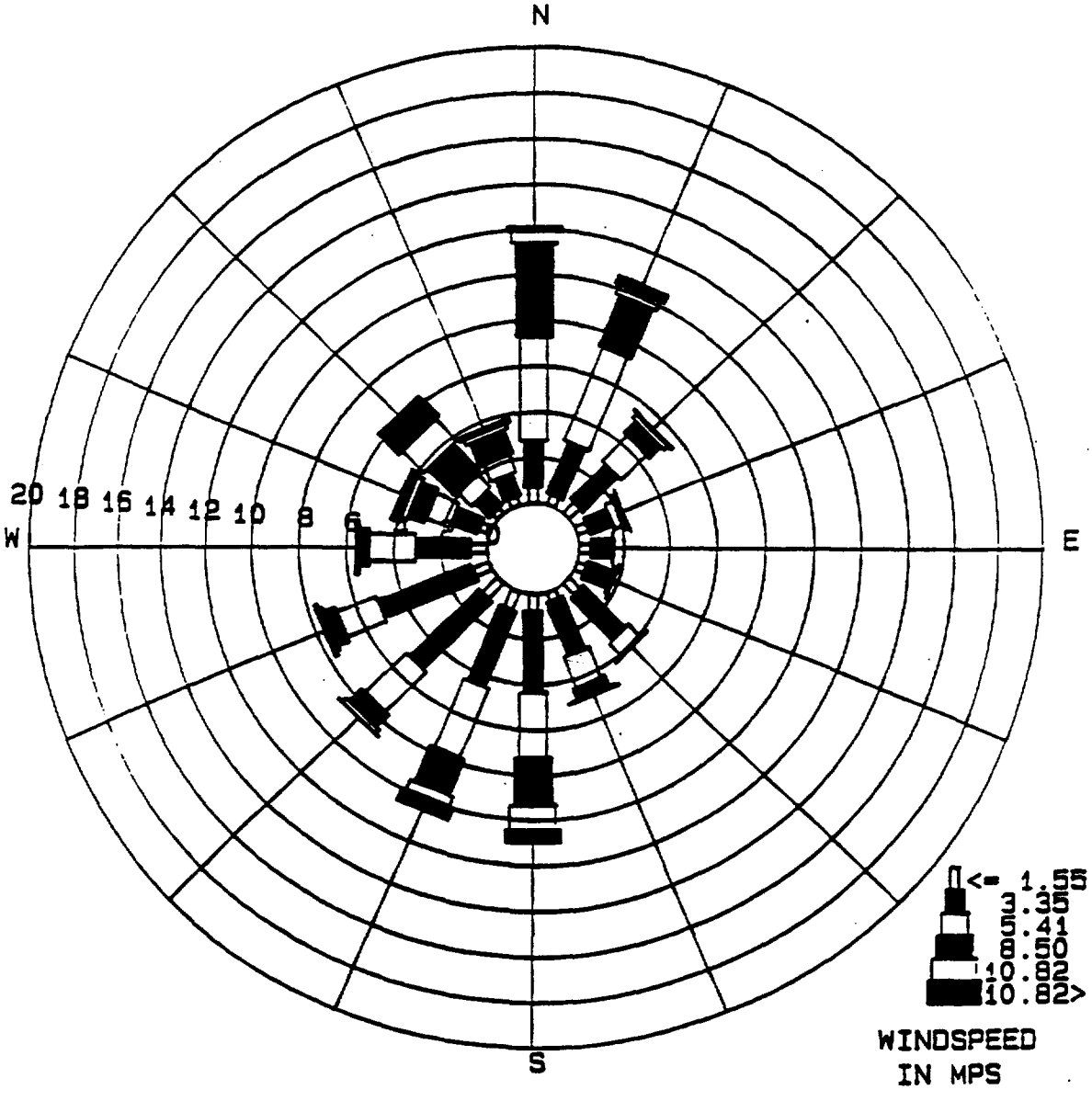
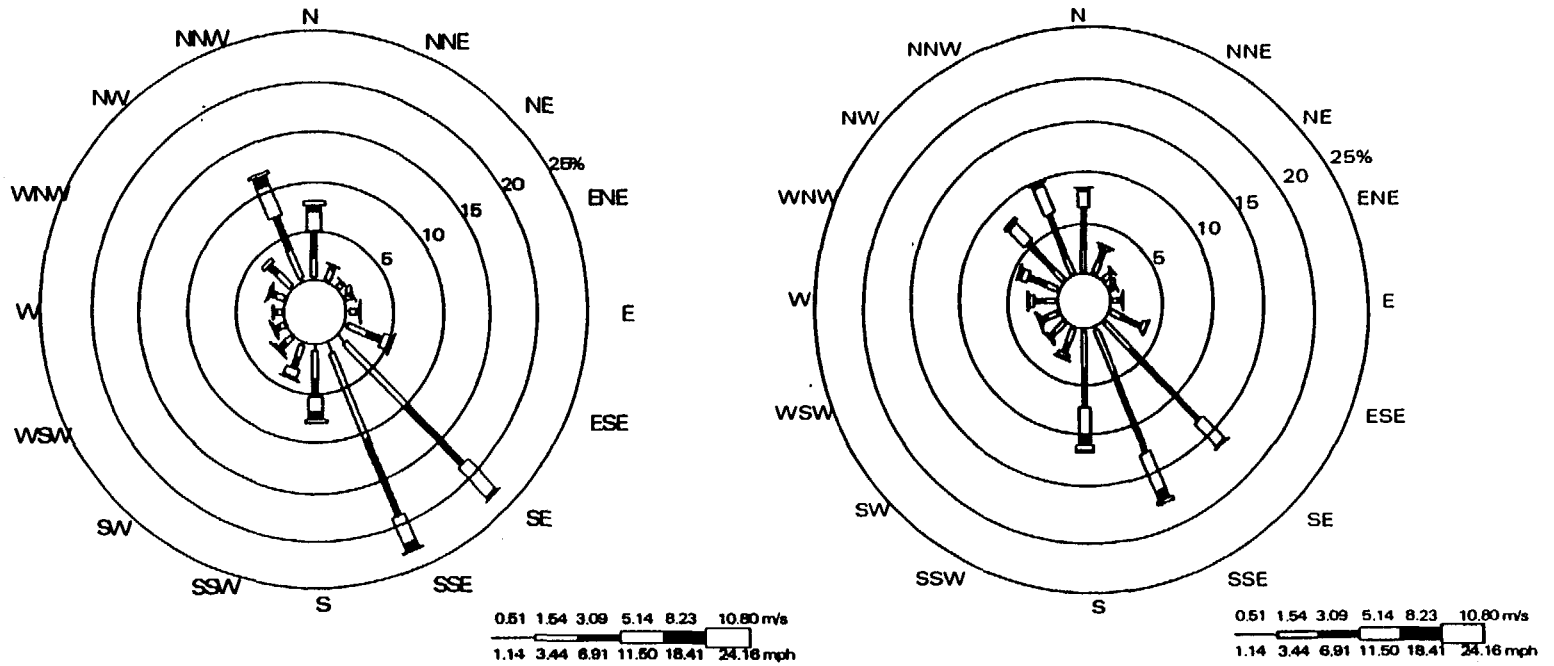


Figure 3-1

Carruth Declaration Exhibit 4

Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation of the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah

Figure 3-5: Wind roses for Salt Lake City and for the location near the Pony Express convenience store in Skull Valley



Pony Express Convenience Store

Salt Lake City, 1984 - 1991

Figure 3.5. Wind roses for Salt Lake City and for the location near the Pony Express convenience store in Skull Valley. The Skull Valley wind rose is based on meteorological data from December 19, 1996, through December 29, 1998.The percentage of the time the wind is from each direction is plotted as a series of bar segments extending from the center of the diagram toward the direction *from which* the winds come. Wind-speed classes are represented by width and shading of the bar segments; the length of any segment indicates the percentage of all measurements for which the wind is from the indicated direction *and also in* the indicated wind- speed class. Units of wind speed are given in meters per second (m/s) and miles per hour (mph).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	

DECLARATION OF GEORGE H. C. LIANG

George H. C. Liang states as follows under penalties of perjury:

1. I am currently employed by Stone & Webster, Inc. - a Shaw Group Company - as Senior Principal Environmental Engineer. I am providing this declaration in support of a motion for summary disposition of Contention OGD O (OGD O) in the above captioned proceeding to show that the Private Fuel Storage Facility (PFSF) will have no cumulative environmental impacts with the other facilities listed in OGD O with respect to groundwater transmission of contaminants.

2. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this declaration. I have extensive experience in the analysis of hydrologic processes, including over 15 years experience in the calculation and evaluation of flood events and groundwater dispersion. Through my involvement in various flooding and groundwater evaluations of nuclear facilities performed by Stone & Webster during this period, I am intimately familiar with the NRC requirements and standard industry practice for evaluating flood events and groundwater dispersion. I have reviewed the proposed project site area. I am knowledgeable of the location of the PFSF, the hydrologic and meteorological conditions of that area, and the area's topography. I am also generally familiar with the design and operation of the facility.

3. Contention OGD O asserts that

> The license application poses undue risk to public health and safety because it fails to address environmental justice issues. . . . Within a radius of thirty-five miles the members of OGD and the Goshute reservation are inundated with hazardous waste from: Dugway Proving Ground, Deseret Chemical Depot, Tooele Army Depot, Envirocare Mixed Waste storage facility, APTUS Hazardous Waste Incinerator, and Grassy Mountain Hazardous Waste Landfill.

Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 258 (1998), recons. granted in part and denied in part, LBP-98-10, 47 NRC 288, 298-99 (1998).

4. OGD O Basis 5 claims that any environmental assessment must look at all hazardous facilities in the area as part of the cumulative and disproportionate impacts that OGD has been made to suffer from the facilities enumerated in OGD O. It claims that the PFSF Environmental Report (ER) fails to consider such disproportionate impacts that may be suffered by members of the Skull Valley Goshutes.

5. At the outset, the PFSF cannot contribute to cumulative impacts to groundwater quality because there is no direct hydrological link between the groundwater and surface at the PFSF site. Very low soil permeability and the depth to groundwater (125 ft.) on the PFS site prevent rainwater from percolating to groundwater depth. ER § 2.5, p. 2.5-11. Based on borings and laboratory test data, the uppermost layer of soil at the PFSF site extends to a depth of between 25 and 35 ft. below existing grade and is mainly interlayered silt, silty clay, and clayey silt. ER, § 2.6.5. Soil interpretations prepared by USDA[1] indicate that the permeability of a silty soil in Skull Valley ranges from 0.2 to 0.6 inch/hr. ER, § 2.5.5. This type of soil, acting as a natural barrier, would slow down water seepage toward the groundwater table and enable appropriate actions to be taken if any contamination is detected. Furthermore, evapotranspiration at the site

[1] U.S. Department of Agriculture, undated, Soil survey of Tooele County, Utah, unpublished maps and data, Natural Resource Conservation Service, Tooele, UT.

would make it unlikely that any water at the surface would ever reach the groundwater below.

6. Because of the arid climate and geologic conditions in and around the Stansbury and Cedar Mountains, which bound the valley on the east and the west respectively, most of the runoff from the mountains either evaporates or infiltrates into alluvial materials near the margins of Skull Valley. PFSF Draft Environmental Impact Statement ("DEIS") at p. 3-9. The source of groundwater flow at the PFSF is mainly derived from precipitation that falls at the higher elevations of the Stansbury and Cedar Mountains. Groundwater in Skull Valley migrates generally northward toward the Great Salt Lake. ER, § 2.5.5.

7. As the above discussion illustrates, there is no credible pathway for either surface water or groundwater contamination from the construction or routine operations of the PFSF.

8. Second, there will be no significant emission of contaminants from the PFSF into the ground. During construction, because the PFSF site is not hydrologically linked to the groundwater beneath it, the only potential impacts on groundwater would result from large, unmitigated spills of liquids such as fuels. PFS, however, will have a Spill Prevention, Control, and Countermeasures plan that will prescribe methods of mitigation. DEIS at 4-9. Therefore, construction of the PFSF will not result in significant impacts on groundwater at the Reservation.

9. During operations, the only chemicals present at the PFSF will be those common to any industrial facility of this size used for normal janitorial cleaning. Almost all cleaning compounds will be biodegradable. They will be introduced into the sanitary waste system as a part of normal cleaning of sinks and toilets, where they will be treated by natural mechanisms. The only substances, elements, and chemicals that will be used at the PFSF that are listed as hazardous materials in accordance with 40CFR355, Appendix A (EPA), 49CFR172, Subpart B (DOT), or 29CFR1910, Subpart H (OSHA),

are lubricating oils and diesel fuel. Other than diesel fuel, these will be present only in limited quantities.

10. All hazardous materials at the PFSF will be marked and stored in designated locations in sealed containers and controlled in accordance with facility procedures as required by government regulations. Lubricant oils will either be contained in facility equipment gearbox compartments or kept for spare use in limited quantities in sealed metal drums in designated operating and maintenance storage areas. Diesel fuel will either be contained in facility vehicle tanks or in double containment above ground storage tanks in the fuel dispensing stations. Further, janitorial cleaning agents will be stored in marked sealed containers in designated janitor closets.

11. Radioactive material associated with the spent fuel at the PFSF will be contained within sealed metal canisters. Under both normal and off-normal conditions, there is no credible potential for breach of the canisters and release of radioactive material. ER at 3.4-1. In addition, because of the "Start Clean/Stay Clean" operating philosophy of the PFSF and the way it is implemented, it is not credible for radiological contamination to enter the environment from the facility. First, reactors shipping fuel to the PFSF will employ special procedures to ensure that canisters are not contaminated when they leave the reactor sites. Second, PFS will survey the spent fuel shipping casks in which the canisters are transported for contamination when they arrive at the PFSF site. Therefore, it is not credible that a contaminated canister would be accepted for storage at the PFSF and thus, surface radiological contamination is not a potential source of contaminants that could enter the surface water or groundwater at the site.

12. Therefore, the limited quantities of hazardous materials at the PFSF will be contained and controlled such that they will not have the potential to adversely affect the surrounding environment. In addition, the lack of direct hydrological link between the groundwater and surface at the site, discussed above, further precludes interaction of such liquids with the groundwater located underneath the PFSF site. Thus, there will be no potential contribution from the PFSF to the cumulative impacts with respect to any

groundwater contamination that may exist from the facilities listed in Contention OGD O.

13. In addition, cumulative impacts in the vicinity of the Skull Valley Band of Goshute Reservation from surface water or groundwater transmission of contaminants from the facilities listed in OGD O is not feasible, given the distances between the facilities and the Reservation, the geography of the area, and the local climate. Dugway Proving Ground lies approximately 10 miles southwest of the PFSF site, on the other side of the Cedar Mountains. Declaration of George Carruth (May 24, 2001) ¶ 21. This is the distance to Dugway's main administrative area, while the areas used for storage, disposal, and use of hazardous materials lie another 8 or more miles further to the southwest. Id. Deseret Chemical Depot is located southeast of the site in Rush Valley. The chemical agent disposal facilities are approximately 20 miles from the site. Id. Tooele Army Depot is located just to the west of the town of Tooele and is approximately 20 miles northeast of the site. Id. Both Deseret Chemical Depot and Tooele Army Depot are located on the east side of the Onaqui and Stansbury Mountain ranges. The Envirocare Low-Level and Mixed Waste Storage Facility is located northwest of the site, on the other side of the Cedar Mountains, at a distance of approximately 25 miles. Id. The APTUS Hazardous Waste Incinerator is also located northwest of the site, on the other side of the Cedars, at a distance of approximately 25 miles. Id. Grassy Mountain Hazardous Waste Landfill is located to the northwest as well, on the west side of the Grassy Mountains, at a distance of approximately 37 miles. Id.

14. Even if contaminants from the facilities listed in OGD O were to enter the groundwater or be deposited on the surface through some pathway, due to the distance from the facilities to the Reservation, the contaminants would not reach the Reservation in significant concentrations. First, there are no bodies of water that are near any of the enumerated facilities that connect with the Reservation; hence there are no pathways for transportation of contaminants from the enumerated facilities to the Reservation on the surface.

15. Second, none of the facilities enumerated in OGD O are located in Skull Valley. As discussed above, the Skull Valley aquifer is recharged mostly by precipitation in and runoff from the Stansbury and Cedar Mountains on either side of the valley. Based on my knowledge of aquifers and hydrology generally and the geography and distances involved here, it is highly unlikely that the aquifers beneath the OGD O facilities are connected to the aquifer beneath the Reservation. In fact, the groundwater to the north of the Reservation, in the vicinity of the Aptus incinerator, the Envirocare mixed waste site, and the Grassy Mountain landfill, flows to the west or northwest, away from the Reservation.[2] Groundwater in Rush Valley, on the east side of the Stansbury Mountains, in the vicinity of Tooele Army Depot and the Deseret Chemical Depot, flows to the north or northeast, also away from the Reservation.[3] If the aquifers beneath the facilities listed in OGD O are not hydrologically connected to the aquifer beneath the Skull Valley Reservation, then any contaminants released at the listed facilities simply would not reach the Reservation.

16. Third, even assuming that the aquifer(s) beneath the enumerated facilities are hydrologically connected to the aquifer in Skull Valley, contaminants in the groundwater from the facilities would be dispersed, decayed, and diluted to an insignificant and undetectable level before they reached the aquifer beneath the Reservation. An example was given by American Nuclear Society (American Nuclear Society, 1980, "American National Standard for Evaluation of Radionuclide Transport in Ground Water for Nuclear Sites," ANSI/ANS-2.17-1980). Assuming a radioactive liquid

[2] U.S. Department of the Interior, Bureau of Land Management, Draft Environmental Impact Statement, Aptus Industrial and Hazardous Waste Treatment Facility, Tooele County, Utah (Feb. 1988) at 3-13; U.S. Department of the Interior, Bureau of Land Management, Final Environmental Impact Statement, USPCI Clive Incineration Facility, Tooele County, Utah (Feb. 1990) at 3-22.

[3] Program Manager for Chemical Demilitarization, Draft Environmental Impact Statement, Disposal of Chemical Agents and Munitions Stored at Tooele Army Depot, Tooele, Utah (Mar. 1989) at 3-37 to 3-40.

enters a typical unconsolidated sand aquifer which has an average saturated thickness of 10.0 m, the maximum concentration of the radioactive material in the liquid would be diluted by a factor of approximately 10^5 at a point 120 m downstream from the source.[4] The calculated results include considerations of the longitudinal and transverse dispersion and sorption.

17. Thus, for the foregoing reasons, a release of contaminants at the facilities listed in OGD O would have no significant impact on the groundwater in the vicinity of the Skull Valley Reservation and the PFSF.

I declare under penalties of perjury that the foregoing is true and correct.

Executed on May 24, 2001.

George H. C. Liang

George H. C. Liang

[4] The dilution factor of 10^5 applies to the point of maximum concentration of material in the plume at a downstream distance of 120 m (which is at the center of the plume). It also applies to the point in time at which the concentration of material 120 m downstream would be highest. Away from the center of the plume the concentration of material is further reduced.

Liang Declaration Exhibit 1

Resume

Experience Summary

Dr. Liang is a Senior Principal Environmental Engineer in the Environmental Sciences & Engineering Department. He has over 26 years of experience in siting, environmental assessment, developing and managing environmental protection programs, and licensing of power plants and industrial facilities. He also has extensive experience in mathematical modeling, numerical analysis, and computer applications in environmental engineering/design related problems. He is currently a Program Manager and has previously been a Lead Environmental Engineer on major projects in nuclear/fossil power plants and industrial projects, which involved environmental impact studies, federal/state/local permitting applications, managing engineering/design, procurement and installation of water and wastewater treatment systems, conceptual design of the heat dissipation/chemical discharge system, studies of alternative cooling systems, groundwater dispersion, hydrological analysis of power plant sites and thermal/water quality impact analysis of power plant discharge.

As Supervisor of Water Quality and Hydrology, Dr. Liang has supervised many water quality and hydrology related tasks for power plant projects. He established the technical guideline for flood analysis at power plant sites. He managed the environmental impact assessment of a fluidized bed power plant site and prepared its permit application. He established the exclusion criteria for siting a Low-Level Radioactive Waste disposal facility in Maine, to assure compliance with federal and state requirements. He evaluated existing permit requirements to determine the potential environmental impacts of rerating a nuclear power plant. Dr. Liang completed the conceptual design of a surface run-off detention pond for a proposed NPR site in Idaho, a cooling pond for a proposed power plant site in Florida, a multiport diffuser for a cogen plant in New York and a combined cycle power plant in England, U.K. He has developed the water quality monitoring program and conducted the hydrothermal/water quality modeling for numerous power plant projects.

Dr. Liang has been a lead environmental engineer on major projects in nuclear, fossil, and industrial plants.

Dr. Liang has been an expert in mathematical modeling of surface water, groundwater, water quality, hydrological and hydrothermal analysis.

Dr. Liang has been intimately familiar with EPA's National Pollution Discharge Elimination System (NPDES) permit application regulations and the requirements of section 401 of the Water Quality Act (WQA), which amended Clear Water Act (CWA) section 402(1)(2). He has assisted many major utility clients as well as independent power producers in obtaining the NPDES permit.

Dr. Liang has participated in numerous siting studies for various type of power generation projects and Low Level Radioactive Waste disposal facilities. He has designed and supervised many environmental monitoring programs for siting studies, and prepared permit applications and supporting documentations.

As a member of ICE team, Dr. Liang has participated in evaluating DOE's Environmental Restoration and Waste Management Five-Year plan. He has assisted DOE in environmental cleanup activities at Handford site, and managed environmental studies for the U.S. AMTL research reactor decommissioning project.

Dr. Liang developed a comprehensive environmental protection program at a nuclear power plant construction site. He monitored project construction activities for regulatory compliance in air and water quality, noise, wetlands and wildlife refuge protection, and solid waste disposal. Dr. Liang integrated the environmental protection program with the quality assurance and safety/health programs to measure program performance. He provided the impetus to implement similar programs at other nuclear power plant sites.

Dr. Liang has performed a technical review of the existing environmental operating limit permits and supporting documentation (316a and 316b demonstrations) and assessed the impact of the power uprate on the plant's ultimate heat sink.

In 1994, Dr. Liang managed a consulting services project for improving the technical ability of 22 senior engineers from East China Electric Power Design Institute, dealing with the requirements for a Conventional Island design associated with a nuclear power plant.

Since 1995, Dr. Liang has been working as Lenders' engineer for several fossil power plant projects in China. Working as an Independent Technical Consultant (ITC), he has been responsible for the due diligence effort which includes technical review of engineering/design of the major plant systems, review and evaluation of fuel sources and cost, project performance parameters and guarantees, environmental parameters for compliance with PRC's regulations and World Bank guidelines; construction progress monitoring for funding drawdown certification, start-up/test procedure review, and witnessing the 72-hour and 24-hour test runs, and certification of completion of several fossil power plant projects in China.

Recently Dr. Liang has been in charge of developing EPC cost data base for fossil power plant in China.

Education

Ph.D., Civil Engineering - University of Connecticut, Storrs, Connecticut - 1972
M.S., Civil Engineering - University of Connecticut, Storrs, Connecticut - 1967
National Taiwan University, Taipei, Taiwan, Republic of China

Training

China Forum - since 1995, a lunch-time seminar series, meeting once every other month, covered the topics of information, challenges, strategies, recent development, and successful projects in marketing in China, sponsored by the Office of International Trade & Investment, the Commonwealth of Massachusetts, Foley, Hoag & Eliot LLP, and others.
The Princeton Course/Groundwater Pollution and Hydrology - 1993
Hazardous Materials Management, American Management Association - 1991
Site Selection and Design of Sediment and Detention Basins, Southern New England Environmental Regulation Course, Executive Enterprise, Inc. - 1987
MIT Video Course on Finite Element Methods, Massachusetts Institute of Technology - 1984
Water Resources Lecture Series - Rainfall/Run-off Modeling using HEC-1, Stone & Webster Engineering Corporation - 1982
Sediment Transport in Rivers and Estuaries, University of Southern California - 1974

Licenses, Registrations, and Certifications

Professional Engineer - Connecticut, 09789 - 1975 Active

Professional Affiliations

American Geophysical Union, Member
The Society of the Sigma Xi, Member

Publications

Liang, G.H.C.. "New Technologies in Sulfur Removal in the Refining Process in a Refinery." National Conference for Environmental Managers of Petrochemical Plants, May 1995

Liang, G.H.C., "Use of Groundwater Analytical/Numerical Models for Evaluating Pollution Control Measures at Hazardous Waste Disposal Facilities." New England/Republic of China Technical Exchange Symposium, May 1990.

Liang, G.H.C.. "Summary of Hydrographic and Hydrothermal Studies at Millstone Nuclear Power Station, 1969-1985." Millstone Ecological Advisory Committee Meeting, Waterford, Connecticut. 1986.

Liang, G.H.C.; Lee, V.M.; and Torbin, R.; "A Data Acquisition and Analysis Technique for a Sediment Transport Field Study Program." COASTAL ZONE 78, San Francisco, California, 1978.

Liang, G.H.C. and Lin, J.D., "Effect of Pressure Gradient on Wind-waves in a Laboratory Channel." 2nd U.S.National Conference in Wind Engineering Research, Colorado State University, Fort Collins, Colorado, 1975.

Liang, G.H.C., "Wind-generated Waves With and Without Pressure Gradients." University of Connecticut, Storrs, Connecticut, 1972.

Liang, G.H.C. and Lin, J.D., "Laboratory Win-waves Generated With and Without Pressure Gradients." American Geophysical Union Fall Annual Meeting, San Francisco, California, 1972.

Liang, G.H.C., "Numerical Calculation of the Source Term for a Vertical Line Source Under Linearized Free Surface." University of Connecticut, Storrs, Connecticut, 1967.