

RELATED CORRESPONDENCE

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**March 7, 2001
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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

**OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF**

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 OBJECTIONS AND RESPONSES
TO OGD'S SECOND REQUESTS FOR DISCOVERY**

Applicant Private Fuel Storage L.L.C. ("Applicant" or "PFS") files the following objections and responses to "Ohngo Gaudedah Devia's Second Set of Discovery Requests Directed to the Applicant" ("OGD 2nd Req."), which was served on the Applicant on February 22, 2001.¹

I. GENERAL OBJECTIONS

These objections apply to the Applicant's responses to all of OGD's Second Discovery Requests.

1. The Applicant objects to the OGD's instructions and definitions on the grounds and to the extent that they request or purport to impose upon the Applicant any obligation to respond in manner or scope beyond the requirements set forth in 10 C.F.R. §§ 2.740, 2.741 and 2.742. This objection includes but is not limited to OGD's

¹ Applicant is filing its response on March 7, 2001 pursuant to an agreement with counsel for OGD. See Letter from Paul Gaukler, counsel for PFS, to Joro Walker, counsel for OGD (Mar. 5, 2001).

overbroad definition of PFS to include persons who are not parties to this case. It also includes OGD's overbroad request for supplemental responses, which exceeds what is required under 10 C.F.R. § 2.740(e).

2. The Applicant objects to OGD's Request for Production of Documents to the extent that it requests discovery of information or documents protected under the attorney-client privilege, the attorney work product doctrine, and limitations on discovery of trial preparation materials and experts' knowledge or opinions set forth in 10 C.F.R. § 2.740 or other protection provided by law. The Applicant has provided OGD with a Privilege Log which identifies documents subject to these privileges and protections, which the Applicant reserves the right to supplement.

3. The Applicant objects to OGD's interrogatories and document requests to the extent they seek discovery beyond the scope of OGD Contention O, as admitted by the Board in this proceeding. OGD is only permitted to obtain discovery on matters that pertain to the subject matter with which OGD is involved in this proceeding. 10 C.F.R. § 2.740(b). The only OGD contention admitted by the Board was OGD O. In admitting the contention, the Board specifically limited the scope of OGD O to the issue of "disparate impact[s]" of the PFSF on the "Skull Valley Goshute community" within bases 1, 5, and 6 of the contention. Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 233 (1998).

II. INTERROGATORIES

These interrogatories apply to OGD Contention O, "Failure to Address Environmental Justice Issues."

INTERROGATORY NO. 6. As relevant in any way to OGD's admitted contention, please give the name, address, profession, employer, area of professional expertise, and educational and scientific experience, of each person whom PFS expects to call as a witness and/or expert witness at the hearing. For purposes of answering this interrogatory, the educational and scientific experience of expected witnesses may be provided by a resume of the person attached to the response. Please also describe the subject matter on which each of the witnesses is expected to testify at the hearing, describe the facts and opinions to which each witness is expected to testify, including a summary of the grounds for each opinion, and identify the documents (including all pertinent pages or parts thereof), data or other information which each witness has reviewed and considered, or is expected to consider or to rely on for her or his testimony.

APPLICANT'S RESPONSE: The requested witness information is provided in the attached PFS Witness List for Contention OGD O. PFS objects to this interrogatory to the extent that it requests the production of trial preparation materials. 10 C.F.R. § 2.740(b)(2); see General Objection No. 2.

The objection notwithstanding, the following documents have been reviewed by PFS witness George Carruth:

U. S. Department of the Interior. *Final Environmental Impact Statement: USPCI Clive Incineration Facility*. Tooele County, Utah. Bureau of Land Management, Salt Lake District Office, Salt Lake City, Utah. February, 1990.

U.S. Department of the Army (Army). "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. July, 1989.

U.S. Department of the Army (Army). "Disposal of Chemical Agents and Munitions Stored at Tooele Army Depot, Tooele, Utah," *Draft Environmental Impact Statement*, Program Manager for Chemical Demilitarization. Aberdeen Proving Ground, MD, March 1989.

U.S. Nuclear Regulatory Commission. NUREG-1476: *Final Environmental Impact Statement to Construct and Operate a Facility to Receive, Store, and Dispose of He.(2) Byproduct Material Near Clive, Utah*. August 1993.

U.S. Nuclear Regulatory Commission. NUREG-1714: *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. June, 2000.

Rust Environment and Infrastructure. *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, 1997.

ENVIRON Corporation. *Screening-Level Risk Assessment for the USPCI Clive Incineration Facility.* August 1995.

Science Applications International Corporation. *Tooele Chemical Agent Disposal Facility Quantitative Risk Assessment, Vol. 1,* prepared for U.S. Army Program Manager for Chemical Demilitarization, Aberdeen Proving Ground, MD. December 1996.

Rogers and Associates Engineering Corporation. *Evaluation of the Potential Public Health Impacts Associated with Radioactive Waste Disposal at a Site Near Clive, Utah,* prepared for State of Utah Department of Health, Bureau of Radiation Control. June 1990.

U.S. Environmental Protection Agency. *Environmental Priorities Initiative Preliminary Assessment, Envirocare of Utah, Clive, Utah.* May 1993.

Appendix CC: Bingham Environmental, Inc. *Dose Assessment: Potential Public Health Impacts Associated with Radioactive Waste Disposal at Envirocare.* December 1996

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

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.

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. Washington, D.C. 1977.

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.

U.S. Department of the Interior.. 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, 1988.

Additional facts and opinions to which witnesses are currently expected to testify, the grounds for opinions, and the information the witnesses have reviewed and considered or are currently expected to review or consider are contained in PFS's substantive responses to OGD's requests for discovery, including documents produced or identified by PFS.

INTERROGATORY NO. 7. Please describe in detail any and all analyses, studies, interviews, reports, procedures or other steps taken by PFS (whether they support or refute PFS's position) to identify and/or weigh and/or mitigate any distinct and/or cumulative adverse effects (whether these impacts are the result of, or caused by, real or perceived risk or harm) which the proposed PFS facility and licensing process have had or may have on the Skull Valley Band of Goshute Indians and/or the Skull Valley Band community and/or any other affected low-income and/or minority communities, including any and all analyses, studies, interviews, reports, procedures or other steps taken by PFS (whether they support or refute PFS's position) to identify factors peculiar to these individuals and communities that may be and/or are relevant to these adverse effects.

APPLICANT'S RESPONSE: PFS objects to this interrogatory to the extent that it requests material beyond the scope of that reasonably calculated to lead to the discovery of evidence relevant to Contention OGD O. See 10 C.F.R. § 2.740(b)(1) (discovery relates only to matters in controversy identified by the presiding officer). Specifically, the contention as admitted by the Board is limited to the asserted "disparate impact" of the PFSF that allegedly results from its location on the Skull Valley Band's Reservation. See LBP-98-7, supra, 47 NRC at 233. The scope of the contention is further limited to the impacts set forth in bases 1, 5, and 6 of the contention as admitted.

Id.; Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-98-10, 47 NRC 288, 298-99 (1998). The “licensing process” is not part of the action proposed within the PFS license application and hence any impacts caused by the licensing process per se are outside the scope of this proceeding. See 10 C.F.R. § 51.45(b)(1) (the environmental report shall discuss “[t]he impact of the proposed action on the environment.”) (emphasis added). Impacts on “any other affected low-income and/or minority communities” besides the Skull Valley Band of Goshutes are also outside the scope of OGD O. See LBP-98-7, 47 NRC at 233. Finally, impacts of the PFS project that are not environmental impacts are outside the zone of interest protected by NEPA and hence they are outside the scope of OGD O. Louisiana Energy Services, L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 88 (1998).

Analyses, studies, reports, etc. prepared by or for PFS that include evaluation or discussion of potential environmental impacts of the PFS project that fall within the scope of OGD O comprise: the PFS Environmental Report, responses to NRC Staff Requests for Additional Information, and other studies, e.g., cultural resource impact studies. The portions of those documents that address impacts falling within the scope of OGD are given below:

PFS Environmental Report

Chapter	Section	Subsection
Chapter 2: The Site and Environmental Interfaces	2.7: Socioeconomics	
	2.8: Noise and Traffic	
	2.9: Regional Historic, Scenic, Cultural and Natural Features	
Chapter 4: Environmental Effects of Site and		

Transportation Corridor Construction and Operation		
	4.1: Site Preparation and Facility Construction	
		4.1.1: Effects on Geography, Land Use, and Demography
		4.1.3: Effects on Air Quality
		4.1.4: Effects on Hydrological Resources
		4.1.6: Effects on Socioeconomics
		4.1.7: Effects of Noise and Traffic
		4.1.8: Effects on Regional Historical, Cultural, Scenic, and Natural Resources
		4.1.9: Radiation Doses to Storage Pad Construction Workers
	4.2: Effects of Facility Operation	
		4.2.1: Effects on Geography, Land Use, and Demography
		4.2.3: Effects on Air Quality
		4.2.4: Effects on Hydrological Resources
		4.2.6: Effects on Socioeconomics
		4.2.7: Effects of Noise and Traffic
		4.2.8: Effects on Regional Historical, Cultural, Scenic, and Natural Features
		4.2.9.1: Radiation to the Nearby Population and Onsite Personnel
Chapter 7: Economic and Social Effects of Facility Construction and Operation		
	7.2: Benefits	
	7.3: Costs	
	7.4: Conclusions	

PFS RAI Responses and Commitment Resolution Letters

RAI Response/Letter	Date	Subjects
EIS RAI Q9-1: Land and Water Use: Recreational use.	02/18/99	(a) Estimated recreational use and visits to Skull Valley. (b) Estimated hiker and skier visits to Mt. Deseret.
EIS RAI Q9-2: Land and Water Use: Plans for economic growth and development.	02/18/99	(a) Planning for county and specific land use plans. (b) Plans for economic development by the Skull Valley Band.

RAI Response/Letter	Date	Subjects
EIS RAI Q9-4: Land and Water Use: Current water use.	02/18/99	(a) Current water use and projections for new water use in Skull Valley. (b) Projected water use for all phases. (c) Water use not adversely affected.
EIS RAI Q11-1: Socioeconomic Effects: Lease payments.	02/19/99	Lease payments effect on Skull Valley Band.
EIS RAI Q11-2: Socioeconomic Effects: On and Off reservation differences.	02/19/99	Education, income levels, location, health of Skull Valley Band members on and off the reservation.
EIS RAI Q11-3: Socioeconomic Effects: Local Schools.	02/19/99	Impacts on local schools from the construction and operation workforce moving into the area.
EIS RAI Q11-4: Socioeconomic Effects: Traffic.	02/19/99	Traffic counts for routes to and from the PFSF.
EIS RAI Q11-5: Socioeconomic Effects: Traffic Flow.	02/19/99	Provisions implemented under truck transport option to manage traffic flow and minimize accident risk.
EIS RAI Q11-7: Socioeconomic Effects: Non-Skull Valley Band members.	02/19/99	Social and economic impacts on the residents of Skull Valley who are not Band members.
EIS RAI Q12-1: Cultural Resources: Impact on cultural features.	02/19/99	Communications regarding no impact on known historic, architectural, or cultural features.
EIS RAI Q12-2: Cultural Resources: Surveys.	02/19/99	(a) Prehistoric/Historic occupations. (b) Cultural resource surveys. (c) Surveys for historical and traditional cultural properties. (d) Low corridor rail line survey.
EIS RAI Q12-3: Cultural Resources: Traditional Practices.	02/19/99	Traditional lifestyles and practices of the Skull Valley band.
EIS RAI Q13-1: Environmental Justice: Skull Valley Band	02/19/99	(a) Leadership and governance. (b) Willing jurisdiction/Public acceptability.
EIS RAI Q13-2: Environmental Justice: Traditional activities.	02/19/99	(a) Frequency of activities. (b) Consumption rates of harvested animals and plants.
EIS RAI Q13-3: Environmental Justice: Land View III	02/19/99	Land View III determined not necessary.

RAI Response/Letter	Date	Subjects
EIS RAI Q15-4: Cost/Benefit Analysis: Skull Valley Band income.	02/19/99	Income lost for Skull Valley Band by PFSF.
EIS RAI Q15-5: Cost/ Benefit Analysis: Rail line.	02/19/99	(a) Economic development projects resulting from rail line. (b) Use of rail line by entities in addition to PFSF.
EIS RAI No. 2, Q2-7: Alternatives: Feasibility of constructing a new heavy haul road from Skunk Ridge to the PFSF site instead of a rail line	10/19/99	Effects on Socioeconomics. Effects on Regional Historical, Cultural, Scenic and Natural Features.
EIS RAI No. 2, Q3-9: Affected Environment: Enrollment data for Tooele county schools.	10/19/99	Tooele County public schools enrollment, expansion information.
EIS RAI No. 2, Q3-10: Affected Environment: Cultural resource surveys.	10/19/99	Cultural resource surveys performed for the proposed site and rail line from Skunk Ridge.
EIS RAI No. 2, Q3-11: Affected Environment: Traditional cultural properties.	10/19/99	No known traditional cultural properties in Skull Valley.
EIS RAI No. 2, Q 4-17: Environmental Consequences: Labor sources.	10/19/99	Sources of labor for construction and operation of the PFSF, including estimate of number of Native Americans potentially employed.
EIS RAI No. 2, Q 4-18: Environmental Consequences: State, County, Local expenditures.	10/19/99	Estimate of the amount of state and county tax payments, local payroll, other local expenditures over the life of the PFSF.
EIS RAI No. 2, Q4-23: Environmental Consequences: Economic status.	10/19/99	Locations and economic status of any non-Native American minority and low-income populations within 4 miles of the PFSF.
EIS RAI No. 2, Q4-24: Environmental Consequences: Health status.	10/19/99	Current health status of the Skull Valley population, especially low-income and minority populations.
EIS RAI No. 2, Q2: Skull Valley Band Water Rights. See DEIS Commitment Letter No. 1.	09/15/00	Skull Valley Band water rights in concerning groundwater.

RAI Response/Letter	Date	Subjects
EIS RAI re: Cultural Resources. [Result of 10/25/00 public meeting. See DEIS Commitment Resolution Letter No. 2].	11/01/00	Cultural resources along the Low Corridor rail line.
EIS RAI Nos. 1 – 2; Section 106 of the National Historic Preservation Act (NRC 11/07/00 & 12/12/00 letters).	01/25/01	Class III Cultural Resource Inventory. Includes P-III Associates, Inc. report re: National Register eligibility of Site 42T01187.
<i>See also</i> letter from Leon Bear (Skull Valley Band) to Delligatti (NRC) responding to certain EIS RAIs.	02/16/99	Discusses several of the RAIs in the PFS 02/19/99 response.

Other PFS Studies

Study	Date	Subjects
P-III Associates, Inc., Class III Cultural Resource Inventory of the Private Fuel Storage Project Area in Skull Valley, Tooele County, Utah	June 2000	Cultural resource impacts of the construction of the PFSF and the Low Corridor rail line
PFS Calculation No. 05996.02-G(B)-15, Determination of Aquifer Permeability from Constant Head Test and Estimation of Radius of Influence for the Proposed Water Well, Rev. 1	12/16/99	Assesses effects of groundwater extracted from PFSF well on neighboring wells.
PFS Calculation No. 05996.02-E(B)-03, Traffic/Sound Levels – Skull Valley Road Construction thru Operations, Rev. 1	10/28/97	Traffic/Sound Levels – Skull Valley Road
PFS Calculation No. 05996.02-E(B)-04, Estimated PFSF Construction Related Air Pollutant Emissions, Rev. 3	12/6/99	Evaluates air pollution effects at Goshute Village and Skull Valley Road from PFSF construction
PFS Calculation No. 05996.01-S(Y)-5, Storage Area and Intermodal Site Earthwork Calculations w/Other Site Development Quantity Estimates, Rev. 4	10/18/99	Determines quantity of earthwork during PFSF construction, which is used in PFS Calculation No. 05996.02-P-002 to assess water requirements for soil compaction and minimizing dust emissions.
PFS Calculation No. 05996.02-S(Y)-7, Truck Traffic Estimates on Skull Valley Road, Rev. 4	12/16/99	Evaluates air pollution effects at Goshute Village and Skull Valley Road from PFSF construction

Study	Date	Subjects
PFS Calculation No. 05996.01-UR-1, Accident χ /Qs for the PFSF, Rev. 2	3/24/00	Calculation of dispersion factors for use in radiological calculations
PFS Calculation No. 05996.01-UR-3, Postulated Release of Removable Contamination from Canister Outer Surfaces – Dose Consequences, Rev. 2	5/4/99	Dose consequences from postulated accident at PFSF owner controlled area boundary
PFS Calculation No. 05996.02-UR-9, Accident Dose Calculations at 500m and 3219 m Downwind for Canister Leakage Under Hypothetical Accident Conditions for Holtec MPC-68 and SNC TranStor Canisters, Rev. 1	5/19/99	Calculation of doses from postulated leaking canister at owner controlled area boundary and at nearest residence due to inhalation and immersion in plume.
PFS Calculation No. 05996.02-UR-10, RESRAD Pathway Analysis Following Deposition of Radioactive Material from the Accident Plumes, Rev. 1	5/20/99	Calculation of doses from postulated leaking canister due to deposition of radioactivity on soil at owner controlled area boundary and at nearest residence. Doses are the result of postulated exposure to contaminated ground, inhalation of resuspended material, ingestion of milk and beef following grazing, and ingestion of contaminated soil.
Holtec International Report No. HI-971645, Radiation Shielding Analysis for the PFS, Rev. 1	3/16/00	Dose rates are calculated at the owner controlled area boundary and at the nearest residence from an assumed 4,000 storage cask array at the PFSF.
PFS Calculation No. 05996.02-UR(D)-12, Dose Rates From the 4000 Storage Cask PFSF Array Representative of PFSF Typical Spent Fuel. Assumed to be PWR Fuel Having 35 GWd/MTU Burnup and 20 Year Cooling Time, Rev. 0	3/17/00	Applies scaling factors to previously calculated dose rates from storage cask array to estimate expected (rather than conservatively high) dose rates at the owner controlled area boundary.
PFS Calculation No. 05996.02-UR(D)-13, Dose Calculation at 500 meters for the HI-STORM BWR Canister for Postulated Accident Conditions, Rev. 0	6/20/00	Updates the calculation of dose from a postulated leaking canister at the owner controlled area boundary, based on the latest revision to the Holtec HI-STORM SAR.
PFS Calculation No. 05996.02-P-002, Miscellaneous Design Data Required for PFSF Licensing Documents, Rev. 4	12/16/99	This calculation determines the volumes of water that will be used during construction and operation of the PFSF and the Low Corridor rail line. Water is used for soil compaction, dust mitigation, soil cement, concrete, and water for workers. These volumes of water are used in assessing water truck trips on the Skull Valley Road and quantity of water projected to be extracted from the PFSF well.
PFS Letter, Donnell to NRC, EIS Commitment Resolution Letter #1	11/12/99	This letter provides information regarding photographs that were taken of the PFSF, Low Corridor rail and ITP sites to assess impacts that proposed facilities will have on scenery.

Study	Date	Subjects
PFS Letter, Donnell to NRC, EIS Commitment Resolution Letter #2	11/19/99	This letter provides information on truck trips associated with PFSF construction, which will affect traffic and noise levels on Skull Valley Road.
PFS Letter, Donnell to NRC, EIS Commitment Resolution Letter #6	2/22/00	This letter provides information regarding the quantity of soil to be excavated at the PFSF during construction, which relates to calculations of water needs and fugitive dust emission (air quality) during construction.
PFS Letter, Donnell to NRC, EIS Commitment Resolution Letter #7	2/25/00	This letter provides information on water requirements at the PFSF site for soil compaction and dust control during construction.
PFS Letter, Donnell to NRC, Draft EIS Commitment Resolution Letter #1	9/15/00	This letter provides information on groundwater and PFSF water wells on the Skull Valley reservation.
PFS Letter, Donnell to NRC, Comments on the Private Fuel Storage Draft Environmental Impact Statement	9/21/00	This letter submits PFS's comments on the NRC's Draft EIS. Some of the comments relate to the subject of environmental justice.
PFS Letter, Donnell to Alice Stephenson of the Bureau of Land Management, Class III Cultural Resource Inventory	9/27/00	This letter submits the augmented Class III Cultural Resource Inventory, dated September 2000, prepared by P-III Associates Inc.
PFS Letter, Donnell to NRC, DEIS Commitment Resolution Letter #2	11/1/00	This letter provides information on the Class III Cultural Resources Inventory.

INTERROGATORY NO. 8. Please describe in detail any and all analyses, studies, interviews, reports, procedures or other steps taken by PFS (whether they support or refute PFS's position) to identify and/or weigh and/or mitigate any disproportionate adverse impacts, including cumulative impacts, which the proposed PFS facility and the licensing process have had or may have on **individual** members of the Skull Valley Band of Goshute Indians vis-a-vis other individual members of the Band. In other words, this inquiry is meant to determine if and how PFS has attempted to determine if individual members of the Skull Valley Band are being and will be denied economic, social and other benefits, and thereby suffering disparate adverse impacts, as a result of their real and/or perceived opposition to the PFS facility or as a result of any other issues relevant to the facility. This inquiry is also meant to determine the results of any determination by PFS of any intra-community disparate adverse impacts related to the proposed PFS facility, whether these impacts are based on, or the result of, real or perceived risk or harm. (emphasis in original)

APPLICANT'S RESPONSE: PFS objects to this interrogatory to the extent that it requests material beyond the scope of that reasonably calculated to lead to the discovery of evidence relevant to Contention OGD O. See 10 C.F.R. § 2.740(b)(1).

Specifically, the contention as admitted by the Board is limited to the asserted “disparate impact” of the PFSF that allegedly results from its location on the Skull Valley Band’s Reservation. See LBP-98-7, 47 NRC at 233. The scope of the contention is further limited to the impacts set forth in bases 1, 5, and 6 of the contention as admitted. Id.: LBP-98-10, 47 NRC at 298-99. The “licensing process” is not part of the action proposed within the PFS license application and hence any impacts caused by the licensing process per se are outside the scope of this proceeding. See 10 C.F.R. § 51.45(b)(1). Impacts of the PFS project that are not environmental impacts are outside the zone of interest protected by NEPA and hence they are outside the scope of OGD O. Claiborne, CLI-98-3, 47 NRC at 88.

Any asserted denial of “economic, social and other benefits” to Skull Valley Band members “as a result of their real and/or perceived opposition to the PFS facility or as a result of any other issues relevant to the facility” is outside the scope of this proceeding, which concerns the licensing of the PFSF, not disputes within the Band. Furthermore, alleged disputes within the Skull Valley Band regarding the distribution of economic, social or other benefits are political and/or legal matters that do not fall within the ambit of NEPA. See Metropolitan Edison Co. v. People Against Nuclear Energy, 460 U.S. 766, 776-78 (1983). Consideration of impacts arising from “risk” also falls outside the ambit of NEPA. Id. at 775-77 & n.9.

Analyses, studies, reports, etc. prepared by or for PFS that include evaluation or discussion of potential environmental impacts of the PFS project on individual members

of the Skull Valley Band that fall within the scope of OGD O comprise the same analyses, studies, and reports, etc. described in response to Interrogatory No. 7 above.

INTERROGATORY NO. 9. Please provide a list of any and all persons responsible for and/or who authorized the submission of the information in licensing documents and/or the Draft and/or Final Environmental Impact Statement submitted to the Nuclear Regulatory Commission (NRC) regarding environmental justice issues, including the letter and attachment submitted by Mr. Leon Bear to the NRC on February 16, 1999.

APPLICANT'S RESPONSE: PFS objects to this interrogatory to the extent that it requests information not reasonably calculated to lead to the discovery of evidence relevant to Contention OGD O. See 10 C.F.R. § 2.740(b)(1). Contention OGD O is limited to the impacts set forth in bases 1, 5, and 6 of the contention as admitted. LBP-98-7, 47 NRC at 233; LBP-98-10, 47 NRC at 298-99.

The following individuals were responsible for or authorized the submission to the NRC of information regarding environmental justices issues within the scope of OGD O:

John Donnell (Stone & Webster)
John Parkyn (Private Fuel Storage, L.L.C.)

INTERROGATORY NO. 10. Please provide a list of any and all persons supplying information to PFS, regardless of whether or not the information supports PFS's position, concerning all relevant environmental justice issues, including information related to any singular or cumulative human health, social, economic, community-wide, individual or environmental effects (whether these impacts are the result of, or caused by, real or perceived risk or harm) of the proposed PFS facility or licensing process, and including a list of any and all persons supplying information to PFS relevant to the letter and attachment submitted by Mr. Leon Bear to the NRC on February 16, 1999 (submitted by PFS to the NRC on February 18, 1999 as a response to an EIS Request for Additional Information).

APPLICANT'S RESPONSE: PFS objects to this interrogatory to the extent that it requests information outside the scope of OGD O and this proceeding. See responses to Interrogatory Nos 7 and 8.

The following persons supplied information to PFS concerning environmental justice issues relevant to Contention OGD O:

John Parkyn (Chairman, PFS, LLC)
Barbara Mohrman (Stone & Webster)
Paul Trudeau (Stone & Webster)
Steve Conant (Stone & Webster)
Steve Vigeant (Stone & Webster)
John Hunt (Stone & Webster)
Jeff Johns (Stone & Webster)
Jerry Cooper (Stone & Webster)
Erik Kirstein (Stone & Webster)
Wayne Lewis (Stone & Webster)
John Donnell (Stone & Webster)
Alan Schroedl (P-III Associates)
William Kennedy (Dade Moeller & Associates)
Everett Redmond II (Holtec International)
Leon Bear (Skull Valley Band)
Margaret Swimmer (Hall, Estill, Hardwick, Gable, Golden & Nelson)

III. DOCUMENT REQUESTS

OGD requests that PFS produce the following documents directly or indirectly within its possession, custody or control:

REQUEST NO. 11. All documents in your possession, custody or control that are identified, referred to or used in any way in responding to all of the above interrogatories.

APPLICANT'S RESPONSE: To the extent that documents were used in responding to the above-stated interrogatories and such documents have not already been provided to OGD, PFS will update its repository of documents relevant to the admitted OGD Contention O maintained at Parsons, Behle and Latimer in Salt Lake City.

REQUEST NO. 12. All documents containing or relating in any way to any analyses, studies, interviews, reports, procedures or other steps taken by PFS (whether refuting or supporting PFS's position) to identify and/or weigh and/or mitigate the distinct or cumulative adverse effects of the proposed PFS facility [on] the Skull Valley Band of Goshute Indians and/or the Skull Valley Band community an[d]/or other affected low-income and/or minority communities, including any and all analyses, studies, interviews, reports, procedures or other steps taken by PFS to identify factors peculiar to these individuals and communities that may be and/or are relevant to these adverse effects.

APPLICANT'S RESPONSE: PFS objects to this request to the extent that it requests information outside the scope of OGD O and this proceeding. See responses to Interrogatory Nos 7 and 8. PFS also objects to this request as vague, Dubin v. E.F. Hutton, 125 F.R.D. 372, 376 (S.D. N.Y. 1989), in that the term "relating in any way to" is undefined. PFS objects to this request as overbroad and unduly burdensome, see 10 C.F.R. § 2.740(a)(1); see also Dubin, 125 F.R.D. at 376, in that the term "relating in any way to" could encompass a huge volume of material outside the scope of the contention and the proceeding. The objections notwithstanding, to the extent that such documents have not already been provided to OGD, PFS will update its repository of documents relevant to the admitted OGD Contention O maintained at Parsons, Behle and Latimer in Salt Lake City.

REQUEST NO. 13. Any and all documents relating to or containing analyses, studies, interviews, reports, procedures or other steps taken by PFS (whether refuting or supporting PFS's position) to identify and/or weigh and/or mitigate any disproportionate adverse impacts, including cumulative impacts, which the proposed PFS facility and the licensing process have had or may have on **individual** members of the Skull Valley Band of Goshute Indians vis-a-vis other individual members of the Band. (emphasis in original)

APPLICANT'S RESPONSE: PFS objects to this request to the extent that it requests information outside the scope of OGD O and this proceeding. PFS also objects to this request as vague, overbroad, and unduly burdensome. See Response to Document

Request No. 12, supra. The objections notwithstanding, to the extent that such documents have not already been provided to OGD, PFS will update its repository of documents relevant to the admitted OGD Contention O maintained at Parsons, Behle and Latimer in Salt Lake City.

REQUEST NO. 14. All documents (including experts' opinions, workpapers, affidavits, and other materials used to render such opinions) supporting, refuting, or otherwise relating to testimony or evidence that PFS intends to use at hearing in opposition to or related to OGD's admitted contention.

APPLICANT'S RESPONSE: PFS objects to this request to the extent that it requests information outside the scope of OGD O and this proceeding. See responses to Interrogatory Nos 7 and 8. PFS also objects to this request as vague. Dubin, 125 F.R.D. at 376, in that the terms "otherwise relating to testimony" and "related to OGD's admitted contention" are undefined. PFS objects to this request as overbroad and unduly burdensome, see 10 C.F.R. § 2.740(a)(1); see also Dubin, 125 F.R.D. at 376, in that those terms could encompass a huge volume of material outside the scope of the contention and the proceeding. PFS objects to this request to the extent that it requests trial preparation materials or protected work product. 10 C.F.R. § 2.740(b)(2); see General Objection No. 2.² The objections notwithstanding, to the extent that such documents have not already been provided to OGD, PFS will update its repository of documents relevant to the admitted OGD Contention O maintained at Parsons, Behle and Latimer in Salt Lake City.

REQUEST NO. 15. Please provide any records and documents in any way relevant to the content of the list of any and all persons responsible for and/or who

² See also Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), LBP-83-17, 17 NRC 490, 495 (1983) (work product); United States v. Construction Products Research, Inc., 73 F.3d 464, 473 (2d Cir. 1996) (same); Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), LBP-75-28, 1 NRC 513, 514 (1975) (draft testimony).

authorized the submission of the information in licensing documents and/or the Draft and/or Final Environmental Impact Statement submitted to the NRC regarding environmental justice issues, including the letter and attachment submitted by Mr. Leon Bear to the NRC on February 16, 1999.

APPLICANT'S RESPONSE: PFS objects to this request to the extent that it requests information that is beyond the scope of OGD Contention O as admitted by the Board. PFS also objects to this request as vague, Dubin, 125 F.R.D. at 376, in that the term "in any way relevant to the content of the list" is undefined. PFS objects to this request as overbroad and unduly burdensome, see 10 C.F.R. § 2.740(a)(1); see also Dubin, 125 F.R.D. at 376, in that the term "in any way relevant to the content of the list of any and all persons" could encompass a huge volume of material outside the scope of the contention and the proceeding. The objections notwithstanding, to the extent that such documents have not already been provided to OGD, PFS will update its repository of documents relevant to the admitted OGD Contention O maintained at Parsons, Behle and Latimer in Salt Lake City.

REQUEST NO. 16. Please provide any documents or records containing any information, regardless of whether or not it supports PFS's position, concerning or relevant to any environmental justice issues, including information related to any singular or cumulative human health, social, economic, community-wide, individual or environmental effects (whether these impacts are the result of, or caused by, real or perceived risk or harm) of the proposed PFS facility or licensing process, and including information contained in the letter and attachment submitted by Mr. Leon Bear to the NRC on February 16, 1999.

APPLICANT'S RESPONSE: PFS objects to this requests to the extent that it seeks material beyond that reasonably calculated to lead to the discovery of evidence relevant to Contention OGD O. More specifically, the effects of the "licensing process" are outside the scope of this proceeding. The scope of the contention is further limited to

the impacts set forth in bases 1, 5, and 6 of the contention as admitted. LBP-98-7, 47 NRC at 233; LBP-98-10, 47 NRC at 298-99; see Response to Interrogatory No. 7, supra. PFS will produce any additional documents that have come into its possession beyond those previously produced and made available by PFS. PFS will notify OGD upon updating the repository of documents relevant to the admitted OGD Contention O.

Respectfully submitted,



Jay E. Silberg

Ernest L. Blake, Jr.

Paul A. Gaukler

D. Sean Barnett

SHAW PITTMAN

2300 N Street, N.W.

Washington, DC 20037

(202) 663-8000

Counsel for Private Fuel Storage L.L.C.

Dated: March 7, 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))	

CERTIFICATE OF SERVICE

I hereby certify that copies of the Applicant's Objections and Responses to OGD's Second Requests For Discovery and the Declarations of Jeffrey R. Johns and D. Sean Barnett were served on the persons listed below (unless otherwise noted) by e-mail with conforming copies by U.S. mail, first class, postage prepaid, this 7th day of March 2001.

G. Paul Bollwerk III, Esq., Chairman
Administrative Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
e-mail: GPB@nrc.gov

Dr. Jerry R. Kline
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Atomic Safety and Licensing Board Panel
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Dr. Peter S. Lam
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Deputy Director, Licensing & Inspection
Directorate, Spent Fuel Project Office
Office of Nuclear Material Safety &
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Washington, D.C. 20555

Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attention: Rulemakings and Adjudications
Staff
e-mail: hearingdocket@nrc.gov
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John Paul Kennedy, Sr., Esq.
Confederated Tribes of the Goshute
Reservation and David Pete
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Diane Curran, Esq.
Harmon, Curran, Spielberg &
Eisenberg, L.L.P.
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Richard E. Condit, Esq.
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2260 Baseline Road, Suite 200
Boulder, CO 80302

* By U.S. mail only

* Adjudicatory File
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

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Skull Valley Band of Goshute Indians
Danny Quintana & Associates, P.C.
68 South Main Street, Suite 600
Salt Lake City, Utah 84101
e-mail: quintana@xmission.com


D. Sean Barnett

March 5, 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

DECLARATION OF JEFFREY R. JOHNS

Jeffrey R. Johns states as follows under penalties of perjury:

1. I am with the firm of Stone & Webster, Inc. in Englewood, CO.
2. I am duly authorized to verify Applicant's Objections and Responses to OGD's Second Requests for Discovery; specifically, the responses to Interrogatory Nos. 7, 9, and 10.
3. I certify that the statements in such responses are true and correct to the best of my personal knowledge and belief.
4. I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 5, 2001.


Jeffrey R. Johns

March 7, 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

DECLARATION OF D. SEAN BARNETT

D. Sean Barnett states as follows under penalties of perjury:

1. I am with the firm of Shaw Pittman in Washington, D.C.
2. I am duly authorized to verify Applicant's Objections and Responses to OGD's Second Requests for Discovery; specifically, the responses to Interrogatory Nos. 6-8.
3. I certify that the statements in such responses are true and correct to the best of my personal knowledge and belief.
4. I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 7, 2001.


D. Sean Barnett

PFS Witness List for OGD Contention O

<u>Name and Address:</u>	George Carruth 1210 Halls Chapel Rd. Alexandria, AL 36250
<u>Profession:</u>	Consultant, retired Army Colonel
<u>Employer:</u>	Retired
<u>Professional Expertise:</u>	See attached resume.
<u>Educational, Scientific Experience, and Professional Qualifications:</u>	See attached resume.
<u>Publications in the last ten years:</u>	None
<u>Testifying experience as expert in last four years:</u>	Declarations in support of PFS motions for summary disposition of Contention Utah K
<u>Subject Matter of Testimony:</u>	Col. Carruth will testify concerning the cumulative impacts of facilities enumerated in OGD O.
<u>Documents reviewed and/or relied upon:</u>	The documents reviewed and relied upon by Col. Carruth will include the PFS License Application (including the Safety Analysis Report (“SAR”) and Environmental Report (“ER”)), Responses to Requests for Additional Information, and the Draft Environmental Impact Statement (“DEIS”) for the PFSF. In addition, Col. Carruth may review and rely upon documents produced by PFS, OGD, and the State, as well as any new information that may come into the possession of PFS.
<u>Name and Address:</u>	Roger H. Bezdek Management Information Services, Inc. 116 Fourth Street, SE Washington, DC 20003
<u>Profession:</u>	Consulting and management
<u>Employer:</u>	Management Information Services, Inc.
<u>Professional Expertise:</u>	See attached resume.

<u>Educational, Scientific Experience, and Professional Qualifications:</u>	See attached resume.
<u>Publications in the last ten years:</u>	See attached list
<u>Testifying experience as expert in last four years:</u>	None
<u>Subject Matter of Testimony:</u>	Dr. Bezdek will testify to the effects of the PFS project on property values on and around the Skull Valley Band of Goshute Reservation.
<u>Documents reviewed and/or relied upon:</u>	The documents reviewed and relied upon by Dr. Bezdek will include the PFS License Application (including the SAR and ER), Responses to Requests for Additional Information, and the DEIS for the PFSF. In addition, Dr. Bezdek may review and rely upon documents produced by PFS, the Skull Valley Band, OGD, and the State, as well as any new information that may come into the possession of PFS.
<u>Name and Address:</u>	Stephen Vigeant Stone & Webster, Inc. 100 Technology Center Drive Stoughton, Massachusetts 02072-4705
<u>Profession:</u>	Meteorologist
<u>Employer:</u>	Stone & Webster, Inc.
<u>Professional Expertise:</u>	See attached resume.
<u>Educational, Scientific Experience, and Professional Qualifications:</u>	See attached resume.
<u>Publications in the last ten years:</u>	See attached resume.
<u>Testifying experience as expert in last four years:</u>	Declaration in support of PFS motion for summary disposition of Contention Utah K
<u>Subject matter of testimony:</u>	Mr. Vigeant will testify concerning modeling transportation and level of contamination at the PFSF resulting from air emissions from facilities enumerated in OGD O.
<u>Documents reviewed and/or relied upon:</u>	The documents reviewed and relied upon by Mr. Vigeant will include the PFS License Application

(including the SAR and ER), Responses to Requests for Additional Information, and the DEIS for the PFSF. In addition, Mr. Vigeant may review and rely upon documents produced by PFS, OGD, and the State, as well as any new information that may come into the possession of PFS.

Name and Address:

Dr. George H.C. Liang
Stone & Webster, Inc.
100 Technology Center Drive
Stoughton, Massachusetts 02072-4705

Profession:

Environmental Engineer

Employer:

Stone & Webster, Inc.

Professional Expertise:

See attached resume.

Educational, Scientific Experience,
and Professional Qualifications:

See attached resume.

Publications in the last ten years:

See attached resume.

Testifying experience as expert
in last four years:

Declaration in support of PFS motion for summary disposition of Contention Utah M.

Subject matter of testimony:

Dr. Liang will testify regarding the absence of cumulative impacts at the PFSF site from ground water contamination from facilities enumerated in OGD O.

Documents reviewed and/or
relied upon:

The documents and material reviewed and relied upon by Dr. Liang include the PFS License Application (including the SAR and ER), Responses to Requests for Additional Information, and the DEIS for the PFSF. In addition, Dr. Liang may review and rely upon documents produced by PFS, OGD, and the State, as well as any new information that may come into the possession of PFS.

Name and Address:

Dr. Alan R. Schroedl
P-III Associates, Inc.
2759 South 300 West
Salt Lake City, UT 84115-2932

Profession:

Anthropologist

Employer: P-III Associates, Inc.

Professional Expertise: See attached resume.

Educational, Scientific Experience, and Professional Qualifications: See attached resume.

Publications in the last ten years: See attached resume.

Testifying experience as expert in last four years: None.

Subject matter of testimony: Dr. Shroedl will testify to the absence of impacts on Native American cultural resources from the PFS project.

Documents reviewed and/or relied upon: The documents reviewed and relied upon by Dr. Schroedl will include the PFS License Application (including the SAR and ER), Responses to Requests for Additional Information, cultural resource surveys performed for PFS, and the DEIS for the PFSF. In addition, Dr. Schroedl may review and rely upon documents produced by PFS, OGD, and the State, as well as any new information that may come into the possession of PFS.

Name and Address: John Donnell
Stone & Webster, Inc.
7677 Berry Avenue
Englewood, CO 80111-2137

Profession: Project Director

Employer: Private Fuel Storage, L.L.C

Professional Expertise: Nuclear Engineering and Management

Educational, Scientific Experience, and Professional Qualifications: See attached resume.

Publications in the last ten years: None.

Testifying experience as expert in last four years: Deposition on Contention Utah B in PFS licensing proceeding and declaration in support of PFS motion for summary disposition of Utah B.

Subject matter of testimony:

Mr. Donnell will testify concerning the environmental impacts of the PFS project on and around the Skull Valley Band of Goshute Reservation.

Documents reviewed and/or relied upon:

Materials reviewed and relied upon by Mr. Donnell will include the PFS License Application, including the SAR and ER, responses to Requests for Additional Information, and the PFS DEIS. In addition, Mr. Donnell may rely upon materials both produced by PFS, OGD, and the State and any new information that comes into the possession of PFS.

Name and Address:

Leon Bear
Skull Valley Band of Goshute Reservation
Skull Valley, UT

Profession:

Chairman of the Skull Valley Band

Professional Expertise:

Skull Valley Band of Goshutes

Publications in the last ten years:

None.

Testifying experience as expert in last four years:

None.

Subject matter of testimony:

Mr. Bear will testify to the impacts of the PFS project within the scope of Contention OGD O— Environmental Justice on the Skull Valley Band of Goshutes.

Documents reviewed and/or relied upon:

Materials reviewed and relied upon by Mr. Bear will include the PFS License Application, including the SAR and ER, responses to Requests for Additional Information, and the PFS DEIS. In addition, Mr. Bear may rely upon materials both produced by PFS, the Skull Valley Band, OGD, and the State and any new information that comes into the possession of PFS.

Name and Address:

Mary Allen
Skull Valley Band of Goshute Reservation
Skull Valley, UT

Profession:

Secretary of Native American Church, Local Chapter

<u>Professional Expertise:</u>	Skull Valley Band of Goshutes
<u>Publications in the last ten years:</u>	None.
<u>Testifying experience as expert in last four years:</u>	None.
<u>Subject matter of testimony:</u>	Ms. Allen will testify to the impacts of the PFS project within the scope of Contention OGD O— Environmental Justice on the Skull Valley Band of Goshutes.
<u>Documents reviewed and/or relied upon:</u>	Materials reviewed and relied upon by Ms. Allen will include the PFS License Application, including the SAR and ER, responses to Requests for Additional Information, and the PFS DEIS. In addition, Ms. Allen may rely upon materials both produced by PFS, the Skull Valley Band, OGD, and the State and any new information that comes into the possession of PFS.

RESUME OF
GEORGE A. CARRUTH

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

CARRUTH, GEORGE A.

Page 2

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
U.S. Army Nuclear and Chemical Agency

1984 - 1985

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
Dugway Proving Ground

1981 - 1984

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
U.S. Army Material Development Readiness Command

1978 - 1981

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
Chemical Division, Office of the Deputy Chief of Staff
For Operations and Plans

1975 - 1977

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

RESUME OF
ROGER H. BEZDEK

**Dr. Roger H. Bezdek, President
Management Information Services, Inc.
Washington, D.C.
(202) 889-1324
rbezdek@misi-net.com**

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 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.

Dr. Roger H. Bezdek

Selected Publications

"The Environmental Protection Industry and Environmental Jobs in the U.S.A.." A chapter in Leal Filho and Kate Crowley, eds., *International Perspectives on Environment and Employment*, 2001 (forthcoming).

Survey of Energy and Environmental Programs in Illinois, Iowa, Michigan, Minnesota, Ohio, and Wisconsin. Prepared for the Joyce Foundation, 2001 (forthcoming).

Coal: The Affordable, Secure, Environmentally Compatible Energy Source for the U.S. Prepared for the National Coal Council, 2001.

Do the Department of Energy's Oil and Gas R&D Programs Result in the More Rapid Depletion of U.S. Energy Resources? Prepared for the National Research Council of the U.S. National Academy of Sciences, 2001.

Potential Economic Impacts of the Kyoto Climate Change Protocol on Blacks and Hispanics in the U.S. Prepared for the Center for Energy and Economic Development, 2000.

Prospects and Options for Texaco's Gasification Technologies. Prepared for Texaco, 2000.

The Economic, Employment, and Labor Force Effects of Environmental Protection Programs in Indiana. Prepared for the Joyce Foundation, 2000.

Assessment of the Costs and Benefits of the Department of Energy's Fossil Energy Research, Development, and Demonstration Programs. Prepared for the National Research Council of the U.S. National Academy of Sciences, 2000.

Current and Forecast U.S. Exports of Energy and Environmental Technologies. Prepared for the White House, 2000.

Analysis of Existing Tax Incentives For the Energy Industries and Their Implications For New Clean Air Compliance Incentives For Emission-Free Sources of Electricity. Prepared for the Nuclear Energy Institute, 1999.

Problems and Opportunities for Electric Utility Companies: The J.D. Power/Navigant Survey of Electric Utilities. Management Information Services, Inc., 1999.

"State of the Industry: Jobs and Sales Created by Environmental Protection." *New England's Environment*. Vol. 1, No. 8 (August 1999), pp. 12-16.

Dr. Roger H. Bezdek -- Selected Publications

Potential Effects on the Coal Industry and Related Industries of the Kyoto Protocol, Prepared for the National Coal Council, 1999.

Economic Aspects of the Environmental Remediation of Rocky Flats. Prepared for MACTEC, 1998.

Federal Subsidies and Incentives for the Energy Industries. Management Information Services, Inc., 1998.

History of Department of Energy Funding for Energy Research and Development Programs, 1950 - 1997. Prepared for MACTEC, Inc., 1997.

Future Electricity Prices and Their Relevance to the U.S. Enrichment Corporation. Prepared for the Lockheed Martin Corporation, 1997.

The Untold Story: The Economic Benefits of Nuclear Technologies. Prepared for Organizations United for Responsible Radioactive Waste Solutions, 1997.

Summary of the Implications of the Environmental Justice Movement for EPRI and its Members. Prepared for the Electric Power Research Institute, 1997.

Assessment of the Size and Forecast Growth, 1995 - 2010, of National Health Expenditures, Health Services, and Related Industries. Prepared for Management Analysis Company, 1996.

Costs Incurred by Electric Utilities Due to Federal Air Pollution Control Regulations. Prepared for the Edison Electric Institute, 1996.

With R.L. Hirsch and S.O. Dean, "R&D for a Competitive Power Industry." *Public Utilities Fortnightly*, July 1, 1996, pp. 28-33.

Market Assessment for Commercialization of Superconducting Magnetic Energy Storage. Prepared for the Raytheon Corporation, 1996.

Development of a Business Plan for a Proposed New Internet-Based Venture. Prepared for the Biotechnology Industry Organization, 1996.

Export Potential for U.S. Energy and Environmental Technologies. Prepared for the U.S. Agency for International Development, 1995.

"The Net Impact of Environmental Protection on Jobs and the Economy." Chapter 7 in Bunyan Bryant, editor., *Environmental Justice: Issues, Policies, and Solutions*, Washington, D.C.: Island Press, 1995, pp. 86-105.

Dr. Roger H. Bezdek -- Selected Publications

"The Economy, Jobs, and the Environment." *Proceedings of GEMI '95: Environment and Sustainable Development*, 1995, pp. 65-79.

New Developments in Infrastructure Project Finance: Domestic and International Opportunities for MAC. Prepared for Management Analysis Company, 1995.

Evaluation of the Potomac Electric Power Company's Energy Efficiency and Demand Side Management Programs. Prepared for the Public Service Commission of the District of Columbia, 1994.

Anticipating the Economy and Labor Markets of the 21st Century. Prepared for the American Management Association, 1994.

Economic and Employment Benefits of the Use of Nuclear Energy to Produce Electricity. Prepared for the Nuclear Energy Institute, 1994.

Potential Economic and Employment Impact on the U.S. Economy of Increased Exports of Energy and Environmental Technologies Under NAFTA. Prepared for the White House, 1993.

Federal Government Subsidies for the Energy Industries. Prepared for the Nuclear Energy Institute, 1993.

Using Econometrics to Analyze ENSCAN Data and Develop Estimates of Peak Use, DSM Impacts, and Other Relevant Parameters. Prepared for the Washington Gas Company, 1993.

"The Environmental, Health, and Safety Implications of Solar Energy in Central Station Power Production." *Energy - The International Journal*, Vol. 18, No. 6 (1993), pp. 681-685.

"Environment and Economy: What's the Bottom Line?" *Environment*, Vol. 35, No. 7 (September 1993), pp.7 - 32.

Federal Research and Development Expenditures for Nuclear Energy, Fossil Energy, Renewable Energy, and Energy Efficiency: 1950 - 1992. Prepared for the U.S. Council for Energy Awareness, 1992.

"Sharing Out NASA's Spoils." *Nature*, Vol. 355, January 9, 1992, pp. 105-106.

Environment and Employment in Canada: Final Report of the Symposium. Prepared for the Canada Employment and Immigration Advisory Council, 1992.

Dr. Roger H. Bezdek -- Selected Publications

Economic Benefits of Nuclear Facilities to the Surrounding Areas. Prepared for the U.S. Council for Energy Awareness, 1992.

The Economic and Employment Implications of Energy and Pollution Control Programs in the U.S. and International Markets. Prepared for ICF, Inc., 1992.

"The Greening of American Business: Making Bottom Line Sense of Environmental Responsibility." Chapter 9 in T.F.P. Sullivan, editor, *The Greening of American Business*, Rockville, Maryland: GII Press, 1992, pp. 196 – 224.

Federal Commercialization of Nuclear Energy: A Success Story. Prepared for the U.S. Council for Energy Awareness, 1992.

"Impact of the Space Program on the U.S. Economy: National and State Analyses." *Space Power*, Vol. 11, No. 1 (1992), pp. 43-65.

Market Opportunity Segmentation for Energy and Environmental Information Management Systems. Prepared for the IBM Corporation, 1991.

Right on the Money: Costs, Benefits, and Results of Federal Support for Nuclear Energy. Prepared for the U.S. Council for Energy Awareness, 1991.

"Costs and Results of Federal Incentives for Commercial Nuclear Energy." *Energy Systems and Policy*, Vol. 15, 1991, pp. 269-293.

With J.O. Sillin, "America's Industrial Heartland: Will Electricity Shortfalls Slow its Rejuvenation?" *Strategic Planning for Energy and the Environment*, Summer 1990, pp. 39-66.

Analysis of the Market Potential for Energy and Environmental Information Management Systems During the 1990s. Prepared for the IBM Corporation, 1990.

With J.D. Jones, "Economic Growth, Technological Change, and Employment Requirements for Scientists and Engineers." *Technological Forecasting and Social Change*, Vol. 38, No 4, (December 1990), pp. 375-391.

The Private Sector Economic and Employment Benefits to the Nation and to Each State of NASA Expenditures. Prepared for the National Aeronautics and Space Administration, 1989.

Economic Growth and the Requirements for Electric Power During the 1990s in Illinois, Indiana, and Ohio. Prepared for the U.S. Council for Energy Awareness, 1989.

Dr. Roger H. Bezdek -- Selected Publications

"The Economic and Employment Effects of Investments in Pollution Abatement and Control Technologies." *Ambio*, Vol. XVIII, no.3, (1989), pp. 274-279.

With J.O. Sillin, "Regional Economic Growth and the Need for Power in New England." *Applied Energy*, Vol. 33 (1989), pp. 297-313.

"Acid Rain Abatement: Costs and Benefits." *International Journal of Management Science*, Vol. 17, No. 3 (1989), pp. 251-261.

Evaluation of the Integrated Resources Plan of the Commonwealth Edison Company. Prepared for the Commonwealth Edison Company, 1989.

Environmental Impact and Cost-Benefit Analysis for Environmental Remediation at Kodak Park. Prepared for the Eastman Kodak Company, 1988.

"Manpower Requirements of Scientists and Engineers in High Technology Industries." *International Journal of Management Science*. Vol. 15, No. 1 (1987), pp. 59-71.

Impact of Acid Rain Abatement Legislation on States and Electric Utility Company Costs and Rates. Management Information Services, Inc., Washington, D.C., 1986.

"Long Range Forecasting of U.S. Manpower Requirements: How Accurate Were We?" *Economics of Planning*, Vol. 20, No.1 (1986) pp. 52-67.

Economic and Employment Benefits of Investments in Environmental Protection. Management Information Services, Inc., Washington, D.C., 1986.

With J.C. Easterling. "Calculating Cost Performance Indicators for Solar Energy." *Mineral and Energy Resources*, Vol. 27, No. 6 (November 1984), pp. 1-9.

"Tests of Three Hypotheses Relating to the Leontief Input-Output Model." *Journal of the Royal Statistical Society*. Vol. 147, No. 3 (1984), pp. 499-509.

"The B-1: A History." *Bulletin of the Atomic Scientists*. Vol. 40 , No. 9 (1984), pp. 10-14.

Employment Impacts on Engineers and Scientists of Sales in Specific Industries. Prepared for the Institute of Electrical and Electronics Engineers, 1983.

With A.B. Cambel. "The Solar Energy/Utility Interface." *Energy – The International Journal*. Vol. 6 (1981), pp. 479-484.

Dr. Roger H. Bezdek -- Selected Publications

With B.W. Cone. Federal Incentives for Energy Development. *Energy*, Vol. 5, (1980), pp. 389-406.

With A.S. Hirshberg and W. Babcock, "Economic Analysis of Solar Water and Space Heating." *Science*, Vol. 203 (1979), pp. 214-221.

With E. Roseman, "Costs and Impacts of Financial Incentives for Solar Energy Systems." *Proceedings of the 1978 International Solar Energy Congress*, 1978, pp. 55-61.

With A. Ezra. "Assessment of Incentives to Accelerate Commercialization of Solar Heating and Cooling Systems." *Proceedings of the 1977 Annual Meeting of the American Section of the International Solar Energy Congress*, 1977, pp. 29.1-29.7.

"Some Critical Issues in Manpower Forecasting and Modeling." In J.P. Moore, editor, *Simulation and Modeling in Engineering Manpower Studies*, Washington, D.C.: National Academy of Sciences, 1977, pp. 29-38.

With L.O. Herwig and P.D. Maycock, "Prospectus on Commercialization of Solar Heating and Cooling Systems." *Solar Technology in the Seventies*, International Solar Energy Society, 1976, pp. 151-164.

"Current and Constant Dollar Input Output Forecasts for the U.S. Economy." *Journal of the American Statistical Association*, Vol. 71, No 355 (September 1976), pp. 543 - 551.

With C.R. Dunham, "On the Relationship Between Changes in Input-Output Coefficients and Changes in Product Mix." *Review of Economics and Statistics*, Vol. 58, No. 3, (August 1976), pp. 375-380.

"Disaggregation of Structural Change in the American Economy: 1947-1966." *Review of Income and Wealth*, Vol. 22, No. 2 (June 1976), pp. 167-186.

Long-Range Forecasting of Manpower Requirements: Theory and Applications. New York: IEEE Press, 1975.

"Toward Energy and Manpower Dimensions for the Federal Budget." *Journal of Environmental Systems*, Vol. 5, No. 1 (1975), pp. 29-38.

With A. Sameh, "Efficient Computational Methods for Econometric Models." *The Computer Journal*, vol. 18, Vol. 3, (1975), pp. 248-252.

Dr. Roger H. Bezdek -- Selected Publications

"The 1980 Economic Impact -- Regional and Occupational -- of Compensated Shifts in Defense Spending," *Journal of Regional Science*, Vol. 15, No. 2 (1975), pp. 183 - 198 (reprinted in *Overall National Security Programs and Related Budget Requirements*, U.S. House Armed Services Committee, Washington, D.C., U.S. Government Printing Office, 1975, pp. 367-382.)

"The State of the Art in Long-Range Economic and Manpower Forecasting." *Long-Rang Planning*, (February 1975), pp. 31-42.

With B. Hannon, "Energy, Manpower, and the Highway Trust Fund." *Science*, Vol. 185, (1974), pp. 31-42.

"Whither the Market for College Faculty?" *College and University*, Vol. 49, No 1 (Fall 1973), pp. 77 - 100.

With B. Getzel, "Education and Job Training of Scientists and Engineers." *Monthly Labor Review*, vol. 96, No 11, (November 1973), pp. 521-531.

With B. Hannon, "The Job Impact of Alternatives to Corps of Engineers Projects." *Engineering Issues*, Vol. 99, (October 1973), pp. 521-531.

"The Employment Effects of Counterbudget," *Journal of Economic Issues*, Vol. 6, No. 4 (December 1972), pp. 171-186.

"Progress Report on the CAC Economic and Educational Planning Model, *Transactions of the 1972 IEEE Conference on Decision and Control*, 1972, pp. 685-689.

"Conceptual and Empirical Problems in the Measurement of Prices and Productivity," in *Price and Wage Control: An Evaluation of Current Policies*, Joint Economic Committee, U.S. Government Printing Office, 1972, pp. 242-262.

"A Case Study of the Emergency Employment Act: in the State of Illinois, in *The Emergency Employment Act: An Interim Assessment*, U.S. Senate Committee on Labor and Public Welfare, Washington, D.C., U.S. Government Printing Office, 1972, pp. 75 - 104.

"Long-Range University Planning in View of an Uncertain Future for College Graduates." *Journal of Higher Education*, Vol. XLIII, No. 4 (April 1972), pp. 267-282.

"Manpower Implications of Alternate Patterns of Demand for Goods and Services," *1970 Proceedings of the American Statistical Association*, 1970, pp. 417-422.

RESUME OF
STEPHEN A. VIGEANT

Stephen A. Vigeant

Air Quality Meteorologist

Years Experience (as of October 1999)

At Stone & Webster: 23 With other Firms: 2

Division/Department/Location

Government/Environmental Sciences & Engineering - 042/Boston

Professional History

Stone & Webster Engineering Corporation, Boston, Massachusetts - 1976 to Present

The Pennsylvania State University, University Park, Pennsylvania - 1975 to 1976

The Center for the Environment and Man, Hartford, Connecticut - 1973 to 1973

Major Accomplishments

Author of a chapter on dispersion modeling for hazardous chemical consequence assessments (Chemical Plume Dispersion Analysis) of a Stone & Webster book entitled "Risk Assessment and Risk Management for the Chemical Process Industry."

Areas of Expertise

- Air Quality Permitting, Dispersion Analyses, and Clean Air Act Consulting.
- Meteorological/Climatological Consulting.
- Hazardous Chemical Consequence Assessments.
- Nuclear Power Plant Licensing and Emergency Planning Activities.
- Cooling Tower Environmental Impact Studies.

Division/Department Assignments

Environmental Sciences & Engineering (May 1989 to May 1991)

Dispersion Modeler

Experience Summary

Mr. Vigeant has 23 years of experience in environmental impact assessment and licensing, specifically in the fields of atmospheric dispersion analyses, climatological/field studies, air quality permitting and studies, hazardous chemical consequence assessments, cooling tower impact studies, and nuclear power plant licensing.

As a Lead Environmental Scientist, he has provided the regulatory interface, performed impact analyses, and prepared air permit applications for utility, cogeneration, pulp and paper, municipal, and industrial clients. Included in this work has been the interpretation of state (SIP) and federal (Clean Air Act) regulations, interaction with state and federal regulatory agencies to define requirements, assessment of pollution control technologies (BACT/MACT), performance of dispersion modeling analyses and impact assessments using a variety of EPA-approved models and preparation of applications for state, PSD, and Title V operating permits. Also included has been the preparation of air quality impact assessment sections for environmental impact reports and statements (EIR/EIS), project feasibility studies, and independent review studies as well as the performance of air quality audits at various facilities, "due diligence" reviews, and general air quality (Clean Air Act) consulting (non-attainment review, acid rain, air toxics, permitting).

Mr. Vigeant has provided consulting services in the area of climatological analyses, design basis meteorological investigations (design snow/wind load, tornado/severe weather probabilities, probable maximum precipitation, wind roses, fastest mile wind determinations) meteorological monitoring, and meteorological field studies.

Other work has included assessments of the consequences of postulated accidental releases of toxic and/or explosive chemicals on plant personnel and structures as well as on the public for a variety of petrochemical and industrial clients. These assessments have involved defining the chemical release rate from a hypothesized accident scenario, determining the evolution rate of toxic/explosive vapors, analyzing the dispersion of the chemical plume using appropriate computer models that handle dense gas and/or neutrally buoyant gases (e.g., DEGADIS, SLAB, INPUFF2) and comparing dispersion results with appropriate health and/or explosive concentration criteria (TLV/STEL/IDLH/UEL/LEL).

Mr. Vigeant has also coordinated activities related to the preparation of radiological dispersion analyses, cooling tower environmental impact assessments, site hazard evaluations, design basis meteorological parameters, and climatological description sections for nuclear power plant projects. Included in these activities have been the preparation of climatological summaries for a given site, performance of radiological dispersion analyses using in-house computer programs for licensing and semi-annual report preparation, preparation of control room habitability studies, and modeling of cooling tower drift and visible plume impacts. Also included are the coordination of field studies in complex terrain to define dispersion patterns for emergency planning purposes, development of manual techniques to estimate dispersion of elevated releases, and participation as a controller in emergency planning drills and NRC-graded exercises.

Education

M.S. in Meteorology - The Pennsylvania State University, University Park, Pennsylvania - 1978
B.S. in Meteorology - Lowell Technological Institute, Lowell, Massachusetts - 1974



Publications

Carl A. Mazzola, Stephen A. Vigeant, and Don McCamy, "Application of ARCON96 Atmospheric Dispersion Model to Browns Ferry Nuclear (BFN) CREVS Intake X/Q Calculations". Presented at the Sixth Nuclear Utility Meteorological Data User Group (NUMUG) Meeting, Syracuse, NY, May 12-14, 1999.

Vigeant, S. and C. Wedig, "Biological Systems to Control Stack Gas Emissions". Presented at Bioeast 95: A Forum to Examine Non-Pharmaceutical Biotechnology, Washington, D.C., January 12, 1995.

Dunn, R., W. Frazier, and S.A. Vigeant, "NO_x Compliance Planning Considerations for Utilities Affected by Titles I and IV of the CAAA of 1990. Proceedings of the Electric Utility Congress '93, Boston, Massachusetts, June 15-16, 1993.

Vigeant, S. A., "Is Your Plant Ready to Comply With the Clean Air Act?". Presented at the 21st New England Plant Engineers Conference and Show, Newport, Rhode Island, May 6-8, 1992.

Vigeant, S.A., H.R. Greenberg, and J.J. Cramer; Chapter 10 "Chemical Plume Dispersion Analysis" of a book entitled "Risk Assessment and Risk Management for the Chemical Process Industry," Van Nostrand Reinhold, New York, New York, 1991.

Vigeant, S.A., J.J. Cramer, C.A. Mazzola, and K. Rao, "Atmospheric Impacts of Natural Draft Cooling Tower Emissions," American Power Conference, Chicago, Illinois, 1980.

Vigeant, S.A., C.A. Mazzola, T.J. Burda, and W.S. Novak, "An Emergency Preparedness Assessment Technique Considering Complex Valley Meteorology," American Nuclear Society, San Francisco, California, 1983

Vigeant, S.A. and C.A. Mazzola, "A Manual Overlay Dose Assessment Technique for Elevated Radioactive Releases," American Nuclear Society, San Francisco, California, 1985.

Vigeant, S.A. and A. Kasprak, "Determining the Impact of an Accidental Hazardous Chemical Release," Fifth Joint Conference on Applications of Air Pollution Meteorology, Chapel Hill, North Carolina, 1986.

Vigeant, S.A., and C.A. Mazzola, "Modeling the Impact of an Accidental Hazardous Chemical Release," Proceeding for the International Conference on Vapor Cloud Modeling, Sponsored by the Center for Chemical Process Safety, AIChE, Cambridge Massachusetts, 1987.

Vigeant, S.A. and S. Wiedenbaum, "Assessing the Consequences of Postulated Hazardous Chemical Accidents at an Ethylene Plant: A Case Study," AIChE Summer National Meeting, Denver, Colorado, 1988.

Security Clearances

Department of Energy (DOE), Savannah River Site, L-Clearance - 1986, Inactive

Computer Hardware/Software Capabilities

Mr. Vigeant has comprehensive knowledge of: IBM Mainframe, IBM-compatible PC, JCL, FORTRAN, MS-DOS, Windows 95, MS-Word, Excel Spreadsheet



Training

Making Effective Presentations, Stone & Webster - 1981
Time Management Workshop, Stone & Webster - 1982
Project Management Workshop, Stone & Webster - 1990

Licenses, Registrations, and Certifications

American Meteorological Society, Certified Consulting Meteorologist (CCM) - 1985, Active

Professional Affiliations

American Meteorological Society, Member
Air and Waste Management Association, Member
The Scientific Research Society of America (Sigma Xi), Associate Member



Experience History

STONE & WEBSTER ENGINEERING CORPORATION, BOSTON, MASSACHUSETTS - 1976 TO PRESENT

Environmental Assessments/Due Diligence Reviews (January 1997 to Present)

Electric Utility Clients

Lead Air Quality/Environmental Scientist

Title V Operating Permit Application Preparation (Jan 1998 to present)

Westchester County Department of Public Works - Grasslands Reservation

Lead Air Quality Scientist

Permitting for Wastewater Pumping Station Diesel Generator (June 1997 to April 1999)

Massachusetts Water Resources Authority, Intermediate Pump Station

Lead Air Quality Scientist

Permitting for Central Heating Plant Upgrade (November 1996 to present)

University of Connecticut, Storrs Campus

Lead Air Quality Scientist

Consequence Analysis - Thermoelectric Station (Aug 1996 to Oct 1996)

Companhia Siderurgica Nacional

Boston Extension Ramps Feasibility Study (Feb 1996 to Apr 1997)

Massachusetts Turnpike Authority

Lead Air Quality Scientist

Emissions Inventory for Title V Applicability (Aug 1995 to Dec 1995)

New Hampshire Army National Guard

Title V Operating Permit Assistance Work (Feb 1995 to Dec 1995)

Elrama, Cheswick, Brunot Island, and Phillips Plants - Duquesne Light Company

Task Manager

Title V Operating Permit Assistance Work (Apr 1994 to Aug 1994)

MacIntosh and Larsen Plants - Lakeland Electric & Water Utilities

Task Manager

Independent Reviews of Wind Energy Assessments (Feb 1995 to Sep 1995)

U.S. and European Wind Energy Parks - Confidential Clients

Mobile Source Air Quality Impact Assessment for DEIR/FEIR (Apr 1994 to Jan 1995)

Union Station Intermodal Transportation Center - Worcester Redevelopment Authority

Lead Air Quality Scientist

Air Quality Permitting Plan for Replacement Steam Station (Apr 1994 to Aug 1994)

Minot Street Station - Trigen-Boston Energy Corporation

Lead Air Quality Scientist



NO_x Compliance Planning (June 1994 to Nov 1994)
Elrama, Cheswick, Brunot Island, and Phillips Plants - Duquesne Light Company
Lead Air Quality Scientist

NO_x Compliance Planning (June 1994 to Nov 1994)
Cape Fear, Mayo, Roxboro, and Robinson Generating Stations - Carolina Power & Light
Lead Air Quality Scientist

NO_x RACT Emission Control Plan (June 1994 to Nov 1994)
Amherst Campus - University of Massachusetts
Lead Air Quality Scientist

NO_x RACT Compliance Plan (May 1994 to Aug 1994)
Fairfield Hills Hospital - Connecticut Department of Mental Health
Lead Air Quality Scientist

FGD Scrubber Retrofit Project Permitting (June 1991 to Nov 1991)
Petersburg Generating Station - Indianapolis Power & Light
Lead Air Quality Scientist

Verification Inspection (June 1991)
Paducah Gaseous Diffusion Plant - U.S. Department of Energy
Lead Air Quality Scientist

**Defense Waste Processing Facility (DWPF) Clean Air Act Amendments Compliance Appraisal
(Dec 1990 to May 1991)**
Savannah River Site - U.S. Department of Energy
Lead Air Quality Scientist

Complex Terrain Field Study (Dec 1982 to Dec 1983)
Zimmer Nuclear Power Station - Cincinnati Gas & Electric Company
Lead Meteorologist

**Public Hearings on the Greene County Nuclear Power Plant and 700 MW Fossil Fueled Unit (Oct
1977 to Feb 1980)**
Greene County Nuclear Power Station & 700 MW Fossil Fuel Fired Power Plant (Arthur Kill) -
Power Authority of the State of New York
Meteorologist

Cooling Tower Drift and Plume Model Development (Aug 1976 to Dec 1977)
Greene County Nuclear Power Station & 700 MW Fossil Fuel Fired Power Plant (Arthur Kill) -
Power Authority of the State of New York
Meteorologist



**Specialized Assignments or Functions for Multiple Clients:
Control Room Habitability Studies**

Assignments include:

- Lead Environmental Scientist (March 1999)
Millstone Nuclear Power Station
Northeast Utilities Service Company
- Lead Environmental Scientist (May 1997)
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
- Lead Environmental Scientist (Nov 1994 to Feb 1995)
James A. FitzPatrick Nuclear Power Station
New York Power Authority
- Lead Environmental Scientist (Nov 1991 to Jan 1992)
Salem and Hope Creek Nuclear Generating Stations
Public Service Electric and Gas Company
- Lead Environmental Scientist (June 1987 to Jan 1989)
Comanche Peak Nuclear Generating Station
Texas Utilities Electric
- Lead Environmental Scientist (Mar 1986 to June 1986)
Oyster Creek Nuclear Generating Station
GPU Nuclear
- Lead Environmental Scientist (Oct 1984 to June 1986)
Indian Point 3
New York Power Authority
- Lead Environmental Scientist (Jan 1986 to Mar 1986)
James A. Fitzpatrick Nuclear Generating Station
New York Power Authority
- Lead Environmental Scientist (Feb 1985 to Apr 1985)
Nine Mile Point Unit 2
Niagara Mohawk Power Corporation
- Lead Environmental Scientist (Mar 1981 to Dec 1981)
Beaver Valley Power Station
Duquesne Light Company
- Lead Environmental Scientist (Jan 1983 to Dec 1983)
Shoreham Nuclear Power Station
Long Island Lighting Company



Air Quality (Clean Air Act) Permitting

Assignment include:

- **Lead Air Quality Scientist (June 1997 to Present)**
Braintree-Weymouth Intermediate Pump Station - Plan Approval Application
Massachusetts Water Resources Authority
- **Lead Air Quality Scientist (Aug 1995 to Present)**
Delaware City Compressor Station - State Permitting/FERC Filing
Eastern Shore Natural Gas Company
- **Lead Air Quality Scientist (Jan 1997 to Present)**
University of Connecticut Storrs Campus - Central Heating Plant Modeling
University of Connecticut
- **Lead Air Quality Scientist (Jul 1995 to Nov 1995)**
UCB Chemicals Corporation Radcure Unit (N. Augusta, SC) - Modeling
UCB Chemicals Corporation
- **Lead Air Quality Scientist (Jul 1994 to Present)**
Wells, Maine LNG Facility - State Permitting/Modeling/FERC Filing/Testimony
Granite State Gas Transmission, Inc.
- **Lead Air Quality Scientist (Feb 1993 Aug 1993)**
VPS Fiber Recycle Facility (Auburn, ME) - State Permitting/Modeling
Auburn VPS Partnership, Ltd.
- **Lead Air Quality Scientist (Aug 1992 to Nov 1992)**
Texas Cogeneration Project (Texas, MD) - PSD Permitting/Modeling
United American Energy
- **Lead Air Quality Scientist (Apr 1990 to Dec 1991)**
Fort Edward Cogeneration Project (Fort Edward, NY) - Permitting/Modeling
United American Energy
- **Lead Air Quality Scientist (Nov 1990 to Nov 1991)**
Vineland Cogeneration Project (Gas Turbine) - Modeling
Cogeneration Partners of America
- **Lead Air Quality Scientist (Oct 1989 to Jan 1992)**
Windsor Energy Improvement Project (Standby Diesel Generators) - Permitting/Modeling
Aetna Life Insurance Company
- **Lead Air Quality Scientist (Apr 1988 to Aug 1991)**
Wastewater Sludge Incinerator Retrofit Project - Permitting/Modeling
Greater Lawrence Sanitary District
- **Lead Air Quality Scientist (May 1991 to June 1991)**
Central Steam Facility Boiler Replacement (Oil-Fired Boilers) - Modeling
Brookhaven National Laboratory



- Lead Air Quality Scientist (Mar 1989 to May 1989)
Beckley Cogeneration Project (CFB Boiler) - Permitting/Modeling
Beckley Cogeneration Company
- Lead Air Quality Scientist (Dec 1989 to Jan 1990)
Cogeneration Facility Project (Gas Turbine) - Modeling
City of Dover, Delaware
- Lead Air Quality Scientist (Dec 1987 to July 1988)
RDX Expansion Project (Ammunition Facility) - Modeling
U.S. Army
- Lead Air Quality Scientist (Oct 1988 to Nov 1988)
Port Jefferson Power Station - GEP Stack Height Calc
Long Island Lighting Company
- Lead Air Quality Scientist (Feb 1987 to Mar 1987)
Piscataway Cogeneration Facility (Gas Turbine)
Union Carbide
- Lead Air Quality Scientist (May 1986 to Jan 1988)
Groton Cogeneration Project (Gas Turbine) - Permitting/Modeling
Stone & Webster Development Corporation
- Lead Air Quality Scientist (Jan 1988 to Apr 1988)
Dedado Unit 1 Gas Turbine - Permitting
Guam Power Authority
- Lead Air Quality Scientist (May 1987 to May 1988)
Boiler Oil Cap Relaxation - Modeling
Eastern Fine Paper
- Lead Air Quality Scientist (Mar 1985 to Aug 1985)
Boiler Coal Conversion Project - Complex Terrain Modeling
Hammermill Paper Company
- Lead Air Quality Scientist (Mar 1982 to May 1982)
Boiler Coal Conversion - Complex Terrain Modeling
Eastern Fine Paper
- Lead Air Quality Scientist (Jan 1978 to Aug 1982)
700 MW Coal/RDF Fired Power Plant - PSD Permit Modeling
Power Authority of the State of New York
- Lead Air Quality Scientist (Jan 1980 to Apr 1980)
Getty Methanol Plant
Getty Oil Company



Air Quality (Clean Air Act) Impact Assessments for EIRs/EISs and Studies

Assignment include:

- Lead Air Quality Scientist (Apr 1999 to May 1999)
Connecticut Light & Power - Environmental Regulatory Compliance Assessment
Northeast Generation Company
- Lead Air Quality Scientist (Sep 1998 to October 1998)
MidAmerican Energy - Air Quality Regulatory Compliance Assessment
CalEnergy Company, Inc.
- Lead Air Quality Scientist (Aug 1998 to September 1998)
Waukegan and Crawford Stations - Environmental Regulatory Compliance Assessment
Commonwealth Edison
- Lead Air Quality Scientist (April 1998 to August 1998)
Industrial Facility - Air Quality Regulatory Compliance Analysis
Confidential Client
- Lead Air Quality Scientist (May 1997 to June 1997)
Picatinny Arsenal Environmental Assessment - Air Quality Impact Assessment
U. S. Army
- Lead Air Quality Scientist (Dec 1995 to Feb 1996)
Belchatow Power Plant (Belchatow, Poland) - Dispersion Modeling (Stack Height) Study
Community Energy Alternatives
- Regulatory Specialist (Nov 1995 to Dec 1995)
Technical Background Document: NO_x/VOC Initiative 305 - NO_x Emissions Regulatory Programs
Environment Canada
- Lead Air Quality Scientist (Apr 1994 to Jan 1995)
Union Station Intermodal Transportation Center (Worcester, MA) - DEIR/FEIR Sections
Worcester Redevelopment Authority
- Lead Environmental Scientist (June 1995 to June 1995)
Solvay Paperboard Facility (Solvay, NY) - Dryer Fogging Assessment
Solvay Paperboard Company
- Lead Air Quality Scientist (Feb 1995 to March 1995)
Northside Generating Station (Jacksonville, FL) - HAP Emissions Study for Orimulsion
Jacksonville Electric Authority
- Cooling Tower Impact Specialist (June 1992 to July 1992)
Patriot Coal Fired Generating Station - PSD Application Cooling Tower Impacts
Indianapolis Power & Light
- Lead Air Quality Scientist (June 1991 to Oct 1991)
Aliveri 600 MW Power Plant - Environmental Assessment
Public Power Corporation - Greece



- Lead Air Quality Scientist (June 1990 to June 1991)
Combustion Turbine Siting Study - 20 Sites
Allegheny Power System
- Lead Air Quality Scientist (Nov 1990 to May 1991)
El-Kureimat Environmental Assessment - 600 MW Power Plant
Egyptian Electricity Authority
- Lead Air Quality Scientist (July 1988 to Nov 1988)
Gas Turbine Siting Study - 3 Sites
Eastern Utilities Associates
- Lead Air Quality Scientist (May 1987 to July 1988)
Deer Island Wastewater Treatment Plant Facilities Planning Report and EIS Section
Massachusetts Water Resources Authority
- Lead Air Quality Scientist (June 1990 to Jan 1991)
Fort Meade Energy Plant Environmental Assessment
National Security Agency
- Lead Air Quality Scientist (Oct 1991 to Nov 1991)
Cogeneration Feasibility Study
TIMCO, Inc.
- Lead Air Quality Scientist (Feb 1990 to Jan 1992)
Columbus Park Pumping Station - Permitting Consulting
Boston Water & Sewer
- Lead Air Quality Scientist (Sept 1990 to Apr 1991)
Gas Pipeline Compressor Station - Permitting Consulting
Tennessee Gas Pipeline
- Lead Air Quality Scientist (May 1990)
NSPS Consulting
Puerto Rico Power Authority
- Lead Air Quality Scientist (Nov 1989)
Commuter Rail Extension Feasibility Study - Air Quality Impacts
Massachusetts Bay Transportation Authority
- Lead Air Quality Scientist (May 1988 to Dec 1988)
Ohio-Ontario Clean Fuels Project - EIS
Ohio-Ontario Clean Fuels
- Lead Air Quality Scientist (Sept 1988)
GEP Stack Height Calculation
United Illuminating



- Lead Air Quality Scientist (Jan 1988)
Air Intake Design Consulting - Cavity Analysis
Colombia University
- Lead Air Quality Scientist (Sept 1982 to Dec 1982)
800 MW Fossil Fueled Unit - Environmental Report Section
ARAMCO/SCECO
- Lead Air Quality Scientist (Sept 1982 to Oct 1982)
Mystic Station Coal Conversion Project - EIS Section on Acid Rain
Boston Edison Company
- Lead Air Quality Scientist (Sept 1979 to Dec 1979)
Mason Station Coal Conversion - Complex Terrain Modeling
Central Maine Power
- Lead Air Quality Scientist (June 1979)
Edgar Station Coal Conversion - Coal Pile Fugitive Dust Calculation
Boston Edison Company

Hazardous Chemical Consequence Assessments

Assignments include:

- Lead Environmental Scientist (Aug 1996 to Oct 1996)
Consequence Analysis for Coke Oven Gases- Thermoelectric Station
Companhia Siderurgica Nacional
- Lead Environmental Scientist (Oct 1992 to Feb 1993)
Ammonia and NO_x Emissions Hazard Assessment - Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
- Lead Environmental Scientist (May 1991)
Propane Tank Explosion Analysis
Brookhaven National Laboratory
- Lead Environmental Scientist (Jan 1990 to Apr 1990)
Anhydrous Ammonia Storage Tank Design Study - Lakeview Generating Station
Ontario-Hydro
- Lead Environmental Scientist (May 1989 to Oct 1989)
Chemical Plant Toxic Impact Assessment
Sybron, Inc.
- Lead Environmental Scientist (Aug 1988 to Sept 1988)
Chemical Plant Toxic Consequence Assessment
CIBA-GEIGY



- **Lead Environmental Scientist (July 1986 to Aug 1986)**
Ammonia Storage Tank Consequence Assessment
Sigma Instruments
- **Lead Environmental Scientist (Aug 1988 to Sept 1988)**
Chemical Plant Toxic Consequence Assessment
Hercules, Inc.
- **Lead Environmental Scientist (Mar 1987 to Apr 1987)**
Fort McMurray Plant Toxic/Explosive Consequence Assessment
Syncrude Canada, Ltd.
- **Lead Environmental Scientist (Dec 1985 to Apr 1986)**
Maharashtra Gas Cracker Complex Explosion Analysis
Indian Petrochemical Corporation, Ltd.
- **Lead Environmental Scientist (May 1985 to July 1985)**
Marcus Hook Facility Explosion Analysis
Sun Oil Company
- **Lead Environmental Scientist (Nov 1986 to Dec 1986)**
Marcus Hook Facility Explosion Analysis
BP Oil Company

Nuclear Power Plant Licensing Activities

Assignment include:

- **Lead Meteorologist (April 1998 to July 1999)**
Millstone Nuclear Power Station - Control Room and Site Boundary X/Q Calculations
Northeast Utilities
- **Lead Meteorologist (April 1998 to July 1998)**
Brown's Ferry Nuclear Power Station - Control Room and Site Boundary X/Q Calculations
Tennessee Valley Authority
- **Lead Meteorologist (Sep 1996 to Present)**
Private Fuel Storage Facility - ER/SAR Meteorology and Air Quality Sections
Private Fuel Storage, LLC
- **Lead Meteorologist (Jan 1996 to March, 1996)**
Goodhue County Independent Spent Fuel Storage Installation- ER Meteorology Section
Northern States Power
- **Lead Meteorologist (Nov 1987 to Jan 1992)**
River Bend Nuclear Power Station - Semi-Annual Report
Gulf States Utilities



- Lead Meteorologist (Feb 1987 to Mar 1987)
Pilgrim Nuclear Station - Semi-annual Report
Boston Edison Company
- Lead Meteorologist (May 1977 to Aug 1987)
Beaver Valley Power Station - Licensing
Duquesne Light Company
- Lead Meteorologist (Jan 1981 to Aug 1984)
Nine Mile Point Unit 2 - Licensing
Niagara Mohawk Power Corporation
- Lead Meteorologist (Aug 1976 to Oct 1977)
Greene County Nuclear Power Plant - Cooling Tower Impacts
New York Power Authority
- Lead Meteorologist (Sept 1984 to Sept 1987)
Peach Bottom Atomic Power Station - Emergency Planning Drill Controller (6)
Philadelphia Electric Company
- Lead Meteorologist (Mar 1987 to Dec 1989)
Savannah River Site - Emergency Planning Drill Controller (3)
U.S. Department of Energy
- Lead Meteorologist (Nov 1985 to Dec 1990)
Shoreham Nuclear Power Station - Emergency Planning Drill Controller (20)
Long Island Lighting Company

Testimony Experience

Construction Permit Application Public Hearing, Delaware City Compressor Station
New Castle, Delaware (May 9, 1996)
Eastern Shore Natural Gas Company

Maine Board of Environmental Protection Public Hearing, Wells, Maine LNG Facility
Wells, Maine (March 6, 1996)
Granite State Gas Transmission, Inc.



RESUME OF
GEORGE H. C. LIANG

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.

RESUME OF

ALAN R. SCHROEDL

ALAN R. SCHROEDL

EDUCATION:

B.A., Sociology	1971	Macalester College
B.A., Anthropology	1971	Macalester College
M.A., Anthropology	1976	University of Utah
Ph.D., Anthropology	1976	University of Utah

PROFESSIONAL BACKGROUND:

1971	Staff member, Associated Colleges of the Midwest, San Jose, Costa Rica.
1975-1977	Research Archeologist, Archeological Center, University of Utah, central Utah, southeastern Utah and northeastern Arizona.
1977-1979	Field and Research Archeologist, National Park Service, southeastern Utah and northeastern Arizona.
1977-1978	Visiting Lecturer in Anthropology, University of Saskatchewan.
1978-1979	Assistant Director, Laboratory of Archeology/Cultural Resource Facility, California State University at Fresno.
1978-1980	Assistant Professor of Anthropology, California State University at Fresno.
1980-1982	Adjunct Professor of Anthropology, California State University at Fresno.
1980-present	President and Principal Investigator, P-III Associates, Inc.

PRINCIPAL INVESTIGATOR (MAJOR PROJECTS):

1977	Gowen Site Excavations, central Saskatchewan. Excavation of Early Plains Archaic bison processing site.
1977	1977 Glen Canyon Project, northeastern Arizona and southeastern Utah. Inventory, testing, and excavation of Anasazi and Archaic sites.

- 1978-1979 1978 Glen Canyon Project, northeastern Arizona and southeastern Utah. Inventory, testing, and excavation.
- 1980-1981 MAPCO Rocky Mountain Pipeline Cultural Resource Program, Wyoming, Utah, Colorado, New Mexico, Arizona, and Texas. Overviews, inventory, testing, excavation, and monitoring.
- 1981-1982 Dinkey Creek Testing Program, central California. Inventory and testing of 12 Archaic and Late Prehistoric sites.
- 1981-1984 ETSI Pipeline Project Cultural Resource Program, Wyoming, South Dakota, Colorado, Kansas, Oklahoma, Arkansas, and Texas. Overviews, inventory, testing, and excavation.
- 1983 Rock Springs Excavations, southwestern Wyoming. Excavation of an Archaic campsite.
- 1983-1984 Tar Sands Inventory and Predictive Modelling Project, central and southeastern Utah. Class II inventory of 17,000 acres and predictive modeling.
- 1983-1984 Frontier Pipeline Data Recovery Program, southwestern Wyoming. Excavation of six Archaic and Late Prehistoric sites.
- 1984 Dirty Devil Inventory, central Utah. Inventory.
- 1984 Clear Creek Canyon Feasibility Study, central Utah. Feasibility evaluation of a Fremont museum and interpretive center.
- 1984-1985 Hodzana River Inventory, central Alaska. Inventory and testing.
- 1984-1985 Turquoise Trail Inventory and Ethnohistory Project, northeastern Arizona. Inventory and ethnohistoric investigations.
- 1984-1985 Riverton Rock Art Study, east-central Wyoming. Extensive documentation and interpretation of complex rock art panels.
- 1984-1985 Mesa Verde Cadastral Survey, Mesa Verde National Park, southwestern Colorado. Cadastral inventory of 900 archeological sites.
- 1984-1988 Highway Inventories, northern Utah. Inventory, limited testing, Native American consultation, and archival research on numerous projects.
- 1984-1994 Canyonlands Archeological Project, southeastern Utah. Six seasons of inventory, research design development, analyses of existing collections, and testing of prehistoric sites.
- 1985-1986 Predictive Modelling of Fremont Sites for the Central Utah Project, central Utah. Predictive modelling of site locations and field verification of model.

- 1985-1987 Hard Rocks Testing, Data Recovery, and Ethnohistory Program, northeastern Arizona. Testing of Anasazi and Navajo sites, data recovery at two Anasazi sites and one Navajo site, oral interviewing, and ethnohistoric research.
- 1985-1989 N-16 Data Recovery and Ethnohistory Project, northeastern Arizona. Excavation of 16 Anasazi sites, mapping and testing of six Navajo sites, and ethnographic research among local Navajos.
- 1986-1987 Big Mountain Inventory and Ethnohistory Project, northeastern Arizona. Inventory and ethnographic research among the Hopi and Navajo.
- 1986-1987 Little Boulder Basin Inventory and Testing Project, northern Nevada. Inventory and testing of lithic scatter sites.
- 1987 Post Office Inventories, northern Utah. Inventorying and recording historic buildings, HABS/HAER documentation, and archival research.
- 1987 Burr Trail Testing Project, south-central Utah. Testing at 11 Archaic, Fremont, and Numic sites.
- 1987-1988 Wilson Farmstead Archeology and History Project, northern Utah. Documentation of an early Mormon farmstead and archival research.
- 1987-1988 Highway 67 Data Recovery Project, north-central Arizona. Data recovery at six high-altitude Archaic and Late Prehistoric sites on the North Rim of Grand Canyon.
- 1987-1988 Central Utah Project Monitoring, central Utah. Monitoring 50 backhoe trenches for evidence of Fremont, Archaic, and Paleoindian materials.
- 1987-1988 Carorra's Camp Data Recovery Project, northern Nevada. Excavation of one Late Prehistoric and one Numic site.
- 1987-1988 5300 South Data Recovery Project, northern Utah. Inventory, testing, and excavation of a turn-of-the-century historic trash dump.
- 1987-1988 National Archeological Database Encoding Project—California and Arizona. Encoding bibliographic information on 1500 archeological reports.
- 1987-1988 Elko District and Winnemucca Districts Fire Rehabilitation Inventories, central Nevada. Inventory of burned tracts prior to rangeland rehabilitation.
- 1987-1989 Cottonwood Canyon Cliff Dwelling Excavation and Stabilization Project, southwestern Utah. Excavation and stabilization of a large Virgin Anasazi cliff dwelling.
- 1987-1989 Snyderville Historic Townsite Project, northern Utah. Inventory, documentation, archival research, and testing on a historic town dating to the 1850s.

- 1988 National Archeological Database Encoding Project—Nevada. Encoding bibliographic information on 4500 archeological and historical projects conducted in the state.
- 1988 Salt Lake City International Airport Expansion Inventory, northern Utah. Inventory and testing.
- 1988-1989 Grand Valley Inventory, western Colorado. Inventory of wildlife rehabilitation lands.
- 1988-1989 Bonneville Estates Rockshelter Excavations, eastern Nevada. Test excavation of a dry stratified rockshelter with deposits dating from 6000 B.P. to the historic period.
- 1988-1989 Anderson Junction Inventory, Testing, and Oral History Project, southwestern Utah. Inventory, archival, and historical research and limited testing.
- 1989 State Road 9 Testing Project, southwestern Utah. Testing of a Paiute rockshelter site and a Pueblo I village site and Native American consultation.
- 1989 McCoy Mine Inventory, central Nevada. Inventory of 9000 acres south of Battle Mountain, Nevada.
- 1989 State Road 21 Inventory, west-central Utah. Inventory of a road right-of-way.
- 1989-1991 Burr Trail Excavation Project, south-central Utah. Data recovery at nine Archaic, Fremont, and Paiute campsites and Native American consultation.
- 1990 Tusc-Mac Inventory Project, central Nevada. Inventory of 2500 acres north of Carlin, Nevada.
- 1990 GRB Seismic Line 1 Inventory Project, southwestern Wyoming. Inventory of 80 mi of right-of-way in Sweetwater County.
- 1990 Lower James Creek Inventory, north-central Nevada. Inventory of 1200 acres in Eureka County, Nevada.
- 1990-1991 North Block Testing Project, northeastern Nevada. Testing of 15 Archaic, Numic, and Late Prehistoric sites near Elko, Nevada.
- 1990-1991 Rodeo Creek Inventory, northern Nevada. Inventory of 2500 acres north of Carlin, Nevada.
- 1990-1991 The Betze Project, northern Nevada. Preparation of a treatment plan for archeological sites in Little Boulder Basin.
- 1990-1992 Santa Fe Site Data Recovery Project, north-central Nevada. Excavation of an Elko site north of Carlin.
- 1991 North Brady Vibroseis Project, Wyoming. Inventory.

- 1992 Pacific and Blue Bell Parcels Inventory, Humboldt County, Nevada. Inventory of 380 acres.
- 1992 King's Canyon Inventory. Inventory of 220 acres in west-central Utah.
- 1992-1993 Temple Mountain/Tomsich Butte Historic Mining Districts Evaluation, south-central Utah. Inventory and assessment of two mining districts.
- 1992-1995 *Yaha* Site Data Recovery Project, north-central Nevada. Data recovery at a small open lithic scatter.
- 1992-1995 Heap Leach Data Recovery Program, north-central Nevada. Data recovery of six historic properties.
- 1992-1995 Tailings Impoundment Data Recovery Project, Area I, north-central Nevada. Excavation of six prehistoric sites and one historic site and archival research.
- 1993 Roosters Comb Inventory, Lander County, Nevada. Inventory of 500 acres.
- 1993 Skull Valley 3-D Seismic Inventory, western Utah. Inventory of 511 acres.
- 1993 Emigrant Inventory, Area II, north-central Nevada. Inventory of 600 acres.
- 1993 Site 48LN1584 Reevaluation, southwest Wyoming. National Register reevaluation of an open site.
- 1993- Site 26EU1785 Data Recovery Project, north-central Nevada. Excavation of an open campsite.
- 1993-1995 Site 26EU1494 Data Recovery Project, north-central Nevada. Excavation of an open campsite.
- 1994 Worland Seismic Inventory, Areas 1 and 2, north-central Wyoming. Inventory of 50 mi of right-of-way, Washakie County.
- 1994-1997 East Basin Data Recovery Program, north-central Nevada. Excavation of three open lithic scatter sites.
- 1994 Gold Quarry Haul Road Inventory, Part II, north-central Nevada. Inventory of 6 mi of haul road.
- 1994 Marigold Inventory, Humboldt County, Nevada. Inventory of 1880 acres.
- 1994-1997 Gold Quarry Data Recovery Project, north-central Nevada. Data recovery excavations at four prehistoric sites.
- 1994-1996 Tailings Impoundment Data Recovery Project, Area II, north-central Nevada. Data recovery at six prehistoric sites.
- 1994 Emigrant 3-D Seismic Inventory, southwest Wyoming. Inventory of 30 mi of seismic line.

- 1994-1995 The N35(1) Cultural Resource Inventory and Ethnographic Assessment, north-east Arizona. Inventory and ethnographic assessment of 27 mi of road corridor.
- 1994 Tailings Modernization Historic Sites Reevaluation, northern Utah. Reassessment of National Register eligibility of four historic sites near Black Rock, Utah.
- 1994-1996 Leadville Historic Townsite Consultation, western Colorado. Consulting with client, archeologists, and government representatives regarding National Register significance and directions for future research and activities.
- 1994-1997 Boulder Creek Diversion Project, north-central Nevada. Excavation of two prehistoric sites.
- 1995 Secret Pass Inventory. Inventory of 400 acres in Nye County, Nevada.
- 1995 Site 26EU2124 Data Recovery Project. Excavation of an open campsite in Eureka County, Nevada.
- 1995 Bootstrap/Capstone Cultural Resource Overview. Cultural resource overview, site evaluation, and treatment plans for cultural properties in a 5-mi² area in Elko County, Nevada.
- 1996-1997 Bootstrap Data Recovery Program. Excavation of six prehistoric sites.
- 1996-1997 Site 26EU1505 Data Recovery Project. Excavation of a small, open campsite.
- 1996-1997 Woodruff Creek Inventory. Inventory of 6000 acres in Elko County, Nevada.
- 1997 GQX Inventory. Inventory of 2940 acres and preparation of an overview on 19 mi² in Elko and Eureka counties, Nevada.
- 1997 Archeological Exhibit. Preparation of museum display case exhibits.
- 1997-1998 Carlin Trend and Valmy Trend Land Exchange Inventory. Inventory of 11,000 acres in north-central Nevada.
- 1998 Leadville Mitigation Project. Mitigation of impacts to National Register of Historic Places townsite through archival research and photodocumentation.
- 1998 Fielding Garr Ranch Project. Archeological monitoring and data recovery excavations at Fielding Garr Ranch, Antelope Island State Park, Utah.
- 1998 Electronic Report Formatting. Format and preparation of a report for distribution by National Park Service on the World Wide Web.
- 1998-1999 Glen Canyon Computerized Database. Develop and prepare a computerized database of all sites recorded from 1957-1963 by the upper Colorado River Basin Survey Project.
- 1998-1999 Rossi Mine Inventory. Inventory of 1700 acres in north-central Nevada.

- 1998-2000 Data Recovery Excavations at sites 26EK6487 and 26EK4688, north-central Nevada.
- 1999 Williams Fiber Optic Project. Site inventory and reevaluation in south-central Wyoming.
- 1999 Powder Mountain Inventory. Inventory and site recordation, south-central Wyoming.
- 1999 Fuel Storage Project. Inventory of 2600 acres in northwestern Utah, archival research, and treatment plan development for an historic trail.
- 1999 Midas Project. Inventory and site evaluation in the Gold Circle Mining District, north-central Nevada.
- 1999-2000 Rocky Willow Project. Inventory and site evaluation in an historic mining district, central Nevada.

TEACHING EXPERIENCE:

- 1970 Macalester College, Teaching Assistant.
- 1971 Associated Colleges of the Midwest, San Jose, Costa Rica, Teaching Assistant.
- 1973-1976 University of Utah, Department of Anthropology, Field Instructor and Teaching Fellow.
- 1975-1976 University of Utah, Division of Continuing Education, Correspondence Study Advisor.
- 1976 University of Utah, Department of Anthropology and Division of Continuing Education, Instructor.
- 1977-1978 University of Saskatchewan, Department of Anthropology and Archeology, Assistant Professor.
- 1978-1980 California State University, Fresno, Department of Anthropology, Assistant Professor.
- 1980-1982 California State University, Fresno, Department of Anthropology, Adjunct Professor.

HONORS, AWARDS, AND FELLOWSHIPS:

- 1967 Bloomington Police Officer's Association Scholarship.
- 1967 Macalester College General Scholarship.
- 1968 Barry T. Leithead Endowed Scholarship.
- 1968 DeWitt Wallace Outward Bound Scholarship.

1970 Macalester College General Scholarship.
1971 Macalester College International Center Foreign Study Grant (Costa Rica).
1973 University of Utah Teaching Fellowship.
1974 University of Utah Teaching Fellowship.
1974 University of Utah Academic Affairs Grant for Cinematography.
1974 Utah Museum of Natural History Film Grant.
1977 University of Saskatchewan College of Arts and Science Discretionary Fund Grant (Canada).
1977 Canadian National Research Council Grant (Canada).
1979 Seminar on Chinese Studies Grant, Ministry of Education, Republic of China (Taiwan).
1980 California State University Faculty Research Grant.
1980 National Academy of Sciences' Committee on Advanced Study in China Research Grant: Archeology (People's Republic of China).

PROFESSIONAL ACTIVITIES:

- 1980 Plenary Speaker, Symposium on the Archeology of Southern Utah, Moab, Utah.
1983 Chairperson, Session on Current Research in Wyoming. 41st Plains Conference, Rapid City, South Dakota.
1983-1985 Committee member, Membership Committee, Utah Professional Archeological Council.
1984 Discussant, Dust Devil Cave Symposium. 14th Annual Great Basin Conference, Boise, Idaho.
1986-1988 President, Utah Professional Archeological Council.
1988 Plenary speaker, "Survival Through Time in Canyonlands", Moab, Utah.
1992 Member, Antiquities Task Force, Division of State History, Utah.

REVIEWS:

- 1977, 1990 Reviewer, *American Antiquity*.
1979, 1987 Reviewer, *Plains Anthropologist*.
1980, 1984 Reviewer, Academic Press series, *Advances in Archeological Method and Theory*.
1988 Reviewer, *Current Anthropology*.
1989, 1993 Reviewer, *The Kiva*.
1989, 1993 Reviewer, *Utah Archaeology*.
1998 Reviewer, Idaho Museum of Natural History publication series.

PAPERS AND PRESENTATIONS:

- 1975 "Cowboy Cave." 48th Annual Pecos Conference, Bloomfield, New Mexico. August.
1976 "Rivers and Prehistory." English Department, University of Utah, Salt Lake City. April.
1977 "The Gowen Site." Television interview. CFQC-TV. Saskatoon, Saskatchewan, Canada. September.
1977 "Ancient Site in the City." Newspaper interview. Star Phoenix Daily Newspaper. Saskatoon, Saskatchewan, Canada. October.
1977 "Our Prehistoric Ancestors." Radio interview on "Our Native Land." CBC-Radio. Winnipeg, Manitoba, Canada. November.
1977 "Year of the Buffalo Bones." Interview with Jason Schoonover. *The Westworld* magazine, Volume 13. Vancouver, British Columbia, Canada.

- 1978 "Cowboy Cave—An Archaic Site on the Northern Colorado Plateau." Saskatoon Archeological Society Meeting, Saskatoon, Saskatchewan, Canada. January.
- 1978 (with E. G. Walker) "The Gowen Site: An Early Middle Prehistoric Site on the Northwest Plains." The 16th Annual Meeting of the Saskatchewan Archeological Society, Saskatoon, Saskatchewan, Canada. April.
- 1978 (with E. G. Walker and E. H. Koster) "Procedures and Results of Geoarcheological Studies at the Gowen Site, Saskatoon, Saskatchewan." Annual Meeting of the Geological Association of Canada, Toronto, Ontario, Canada. April.
- 1978 "The Archaic Period People of the Colorado Plateau." Fresno County Archeological Association Meetings, Fresno, California. October.
- 1979 "Archeoastronomy in North America." Myths and Science Program, California State University, Fresno, California. April.
- 1979 "The Archeology of Glen Canyon National Recreation Area: Past, Present, and Future." 2nd Annual Conference on Scientific Research on the National Parks, San Francisco, California. November.
- 1980 "Multivariate Analysis of Early Plains Projectile Points." 13th Annual Meeting of the Canadian Archeological Association. Saskatoon, Saskatchewan, Canada. April.
- 1980 "The Archaic of the Northern Colorado Plateau." Symposium of the Archeology of Southern Utah, Moab, Utah. May.
- 1982 "Cultural Resource Management in the United States." University of Saskatchewan, Saskatoon, Saskatchewan, Canada. November.
- 1982 "Microcomputer Applications to Archeology." University of Saskatchewan, Saskatoon, Saskatchewan, Canada. November.
- 1983 "1983 Excavations in Southwestern Wyoming." 41st Plains Conference, Rapid City, South Dakota. November.
- 1986 "The Central Utah Project." Utah Professional Archeological Council Meetings, Zion National Park, Utah. July.
- 1986 "Canyonlands Survey Project 1986." Utah Professional Archeological Council Meetings, Salt Lake City, Utah. December.
- 1988 "Archaic Occupation on Colorado Plateau." Archeology Week Speaker, Salt Lake City, Utah. April.
- 1990 "The Canyonlands Archeological Project." Utah Statewide Archeological Society Speaker, Moab, Utah. September.

- 1993 "Current Status of Archeology in the Little Boulder Basin Area." Nevada Archeological Association Meetings, Elko, Nevada. May.
- 1994 "CRM Archeology in Little Boulder Basin." University of Nevada, Las Vegas Anthropology Society. November.
- 1994 "Open Site Archeology in Little Boulder Basin Poster Symposium." Great Basin Anthropological Conference, Elko, Nevada. October.
- 1994 "Open Site Archeology in Little Boulder Basin." Multimedia presentation at Great Basin Anthropological Conference, Elko, Nevada. October.

PUBLICATIONS:

- 1972 The Dish Ran Away with the Spoon: Ethnography of Kitchen Culture. In *The Cultural Experience: Ethnography in Complex Society*, edited by J. P. Spradley and D. W. McCurdy, pp. 177-189. Science Research Associates, Palo Alto, California.
- 1974 The Excavation of Innocents Ridge. *Utah Archeology* 20(3):2.
- 1975 A Relative Measure of Psychological Saliency. *Journal of the Steward Anthropological Society* 6(2):138-143.
- 1975 The Excavation of Cowboy Cave. *Utah Archeology* 21(1):1.
- 1975 *Innocents Ridge and the San Rafael Fremont*. Antiquities Section Selected Papers 1(2):29-66. Utah State Historical Society, Salt Lake City.
- 1976 The Bull Creek Excavations. *Utah Archeology* 22(2):1-4.
- 1977 The Paleo-Indian Period on the Colorado Plateau. *Southwestern Lore* 43(3):1-9.
- 1977 The Grand Canyon Figurine Complex. *American Antiquity* 42:254-265.
- 1978 (with E. G. Walker) A Preliminary Report on the Gowen Site: An Early Middle Prehistoric Site on the Northwest Plains. *Napao* 8(1 and 2):1-5.
- 1979 The Archaic Inhabitants of the Northern Colorado Plateau. *Utah Historical Quarterly* 47:344-360.
- 1979 *A Selected Bibliography of Utah Archeology*. Anthropological Papers 102. University of Utah, Salt Lake City.
- 1980 Cultural Features, Ground Stone, and Pottery and Clay. In *Sudden Shelter*, by J. D. Jennings, A. R. Schroedl, and R. N. Holmer, pp. 31-62, 125-142. Anthropological Papers 103. University of Utah, Salt Lake City.

- 1980 (with J. D. Jennings and R. N. Holmer) *Sudden Shelter*. Anthropological Papers 103. University of Utah, Salt Lake City.
- 1985 *Archaic and Late Prehistoric Adaptation in Southwestern Wyoming: The Frontier Pipeline Excavations*. Cultural Resource Series 3. Bureau of Land Management, Wyoming.
- 1988 Site Location and Predictive Modelling. In *The Tar Sands Project: An Inventory and Predictive Model for Central and Southern Utah*, by B. L. Tipps, pp. 113-134. Cultural Resource Series 22. Bureau of Land Management, Utah State Office, Salt Lake City.
- 1989 The Power and the Glory: Shamanistic Arts of the Archaic Period. *Canyon Legacy* 1(1):13-17.
- 1989 (with B. L. Tipps and N. J. Hewitt) Research Design. In *Cultural Resource Inventory and Testing in the Salt Creek Pocket and Devils Lane Areas, Needles District, Canyonlands National Park, Utah*. Selections from the Division of Cultural Resources 1. National Park Service, Rocky Mountain Region, Denver.
- 1991 Paleoindian Occupation in the Eastern Great Basin and Northern Colorado Plateau. *Utah Archaeology* 1991 4(1):1-15.
- 1993 Cultural Affiliation and Age of the Broadbent Cache Site. *Utah Archaeology* 6(1):95-100.
- 1994 (with S. D. Chaffee, M. Hyman, M. W. Rowe, N. J. Coulam, and K. Hogue) Radiocarbon Dates on the All American Man Pictograph. *American Antiquity* 59(4):769-781.
- 1994 (with N. J. Coulam) Cowboy Cave Revisited. *Utah Archaeology* 1994 7(1):1-34.
- 1995 (with N. J. Coulam) The Keystone Azurite Mine in Southeastern Utah. *Utah Archaeology* 1995 8(1):1-12.
- 1996 (with N. J. Coulam) Early Archaic Clay Figurines from Cowboy and Walters Caves in Southeastern Utah. *Kiva* 61(4):401-412.
- 1996 Eastern Great Basin Archaic. In *Archeology of Prehistoric North America: An Encyclopedia*, edited by Guy Gibbons. Garland Publishing, Inc., New York. City.
- 1997 (with N. J. Coulam) Steward Alcove: A Case of Superposition Dating of Barrier Canyon Style Rock Art. *Utah Archaeology* 1997 10(1):45-51.

REPORTS AND MANUSCRIPTS:

- 1971 An Archeological Survey of the Playa Panama Region, Nicoya Peninsula, Guanacaste Province. Submitted to Associated Colleges of the Midwest, San Jose, Costa Rica.
- 1971 The Turrucares Mastodon Site. Submitted to Associated Colleges of the Midwest, San Jose, Costa Rica.
- 1972 (with J. P. Spradley) The Raw and the Cooked: Ethnography of Communicative Competence. Submitted to Macalester College, St. Paul, Minnesota.
- 1976 Archeological Survey of the Dangling Rope Area. National Park Service, Midwest Archeological Center, Lincoln.
- 1976 The Prehistoric Cultural Resources of Lake and Moqui Canyons, Glen Canyon National Recreation Area. Submitted to National Park Service, Midwest Archeological Center, Lincoln.
- 1976 The Archaic of the Northern Colorado Plateau. Ph.D. dissertation, Department of Anthropology, University of Utah, Salt Lake City.
- 1977 Archeological Research in Glen Canyon, 1977. Submitted to National Park Service, Midwest Archeological Center, Lincoln.
- 1980 The Northern Colorado Plateau: An Overview of the Fundamental Prehistoric Context. In Heritage Resource Study Series for the Mount Emmons Project of AMAX, Inc., Gunnison County, Colorado, by K. D. Black. Centuries Research, Inc., Montrose, Colorado. Submitted to State Historic Preservation Office, Denver.
- 1980 Cultural Resource Inventory: MAPCO's Rocky Mountain Liquid Hydrocarbons Pipeline, Utah. Woodward-Clyde Consultants, San Francisco. Submitted to Bureau of Land Management, Salt Lake City.
- 1980 Cultural Resources Survey for Seismograph Services, Inc., in the Wah Wah Mountains in Southwestern Utah. Centuries Research, Inc., Montrose, Colorado. Submitted to Bureau of Land Management, Cedar City, Utah.
- 1981 Cultural Resource Inventory: MAPCO's Rocky Mountain Liquid Hydrocarbons Pipeline, Utah. Addendum. Woodward-Clyde Consultants, San Francisco. Submitted to Bureau of Land Management, Salt Lake City.
- 1982 Archeological Evaluation and Site Inventory in Glen Canyon National Recreation Area, 1978. Submitted to Midwest Archeological Center, Lincoln.
- 1983 (with B. L. Tipps and C. S. Smith) Preliminary Report of a Class II Inventory in the San Rafael Swell, Circle Cliffs and White Canyon Tar Sands Study Tracts. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Richfield, Utah.

- 1984 Site Locational Prediction and Modelling. In The Tar Sands Project: Cultural Resource Inventory and Predictive Modelling in Central and Southern Utah, by B. L. Tipps. Cultural Resources Report 405-1-8401. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Richfield, Utah.
- 1984 Executive Summary of the Cultural Resource Program for the ETSI Pipeline Project. Cultural Resources Report 401-1-8411. P-III Associates, Inc., Salt Lake City. Submitted to ETSI Pipeline Company, Houston, Texas.
- 1984 Test Excavations at Site 48BO379. Cultural Resources Report 408-1-8415. P-III Associates, Inc., Salt Lake City. Submitted to Utah Department of Transportation, Ogden, Utah.
- 1984 Archaic and Late Prehistoric Adaptation: The Frontier Pipeline Excavations in Southwestern Wyoming. Cultural Resources Report 304-1-8418. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Kemmerer, Wyoming.
- 1984 (with B. L. Tipps) Assessment of Cultural Resources for the Clear Creek Canyon Feasibility Study. Cultural Resources Report 408-4-8420. P-III Associates, Inc., Salt Lake City. Submitted to John Short and Associates, Salt Lake City.
- 1986 Fremont Habitation Sites: A Predictive Model of Site Location for the Irrigation and Drainage System, Bonneville Unit, Central Utah Project. Cultural Resources Report 415-1-8606. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Reclamation, Provo, Utah.
- 1986 Preliminary Report on the Excavation of the Five Sites Along the N-16 Road Project, Near Inscription House, Arizona. Cultural Resources Report 412-1-8607. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Indian Affairs, Navajo Area Office, Gallup, New Mexico.
- 1986 Preliminary Report on the Excavation and Ethnohistorical Research Along the N-16 Road Project, Near Inscription House, Arizona. Cultural Resources Report 412-1-8614. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Indian Affairs, Navajo Area Office, Gallup, New Mexico.
- 1986 (with K. W. Russell and A. M. Tratebas) Cultural Resource Inventory and Testing in Little Boulder Basin, Eureka County, Nevada: Final Report. Cultural Resources Report 416-27-8624. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1987 Cultural Resource Inventory of the Bailey Mountain Fire Rehabilitation Area, Elko County, Nevada. Cultural Resources Report 423-1-8726. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.

- 1988 (editor and compiler) Cultural Resource Investigations on the Kaibab Plateau, Northern Arizona: The Highway 67 Data Recovery Project. Cultural Resources Report 420-1-8819. P-III Associates, Inc., Salt Lake City. Submitted to National Park Service, Western Region, San Francisco.
- 1989 Historic and Prehistoric Resources in Grand Valley: Cultural Resource Inventory of the Grand Valley Wildlife Habitat Replacement Area. Cultural Resources Report 433-01-8905. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Reclamation, Upper Colorado Region, Salt Lake City.
- 1989 (with N. J. Coulam) Bonneville Estates Rockshelter. Cultural Resources Report 435-01-8906. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1989 (editor and compiler) Kayenta Anasazi Archeology and Navajo Ethnohistory on the Northwestern Shonto Plateau: The N-16 Project. Cultural Resources Report 412-01-8909. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Indian Affairs, Navajo Area Office, Gallup, New Mexico.
- 1989 (with G. M. Popek and T. T. Prince) Cultural Resource Inventory of the Little Valley Use Area After the Firex-88 Exercise, Tooele County, Utah. Cultural Resources Report 440-01-8910. P-III Associates, Inc., Salt Lake City. Submitted to Utah Division of State History, Antiquities Section, Salt Lake City.
- 1989 (with T. T. Prince) Cultural Resource Inventory of SR 21 from the Nevada Border to Millard/Beaver County Line. Cultural Resources Report 436-12-8911. P-III Associates, Inc., Salt Lake City. Submitted to Utah Division of State History, Antiquities Section, Salt Lake City.
- 1989 Addendum to Cultural Resource Inventory Along Road 9, I-15 to the Virgin River, Milepost 0 to 5, Washington County, Utah. Cultural Resources Report 436-11-8912. P-III Associates, Inc., Salt Lake City. Submitted to Utah Division of State History, Antiquities Section, Salt Lake City.
- 1989 (with T. T. Prince, G. M. Popek, and B. L. Tipps) Cultural Resource Inventory of SR 18, Snow Canyon to Veyo, From Milepost 12.67 to Milepost 19.8, Washington County, Utah. Cultural Resources Report 436-10-8913. P-III Associates, Inc., Salt Lake City. Submitted to Division of State History, Antiquities Section, Salt Lake City.
- 1989 Preliminary Report: Class II and Class III Cultural Resource Inventory In and Around McCoy Mine, Lander County, Nevada. Cultural Resources Report 443-01-8914. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Battle Mountain District Office, Battle Mountain, Nevada.
- 1989 (with B. L. Tipps) Class II and III Cultural Resource Inventory in the Bootstrap Operations Area, Elko and Eureka Counties, Nevada. Cultural Resources Report 441-01-8916. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.

- 1990 Culture History; Horse Canyon Rockshelter; Site 42GA3130; Site 42GA3127. In The Burr Trail Archeological Project: Small Site Archeology on the Escalante Plateau and Circle Cliffs, Garfield County, Utah, by B. L. Tipps. Cultural Resources Report 439-01-9102. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Kanab Resource Area, Cedar City District, Kanab, Utah.
- 1991 (compiler) A Treatment Plan for Prehistoric and Protohistoric Cultural Resources in the Little Boulder Basin Area. Cultural Resources Report 452-01-9101. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1991 (with G. M. Popek) Cultural Resource Inventory of the North Brady Vibroseis Project, T. 17N, R. 100W. Cultural Resources Report 462-01-9103. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Green River Resource Area, Rock Springs, Wyoming.
- 1991 Cultural Resource Inventory of the Green River Prospect Lines 20, 21, 22, 23, and 26, Sublette County, Wyoming. Cultural Resources Report 466-01-9106. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Pinedale Resource Area, Pinedale, Wyoming.
- 1991 Cultural Resource Inventory of Western Geophysical UPR Seismic Lines in Carbon County, Wyoming. Cultural Resources Report 470-01-9113. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Great Divide Resource Area, Rawlins, Wyoming.
- 1991 (compiled with B. L. Tipps) Cultural Resource Inventory, Monitoring, and National Register Evaluations in the Little Boulder Basin Area, Nevada. Cultural Resources Report 474-04-9121. P-III Associates, Inc., Salt Lake City. BLM Report 1-1342(P). Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1991 (compiled with B. L. Tipps) An Assessment of National Register Eligibility of 141 Cultural Properties Recorded by Desert Research Institute and P-III Associates, Inc., in the Western and Southern Portions of the North Block of Barrick Goldstrike Mines, Inc.'s Betze Project, Little Boulder Basin Area, Eureka County, Nevada. Cultural Resources Report 452-04-9124. P-III Associates, Inc., Salt Lake City. BLM Report 1-1523(P). Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1991 (with D. K. Newsome, K. M. Heath, B. L. Tipps, and D. W. Zeanah) An Assessment of National Register Eligibility of 29 Cultural Properties Recorded by Desert Research Institute and P-III Associates, Inc., in the Eastern Portion of the North Block of Barrick Goldstrike Mines, Inc.'s Betze Project, Little Boulder Basin Area, Eureka County, Nevada. Cultural Resources Report 452-05-9128. P-III Associates, Inc., Salt Lake City. BLM Report 1-1527(P). Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.

- 1992 (with B. L. Tipps) Cultural Resource Inventory of Two Well Pads and Access Routes in the Kane Springs Area, Grand County, Utah. Cultural Resources Report 499-01-9208. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Grand Resource Area, Moab, Utah.
- 1992 Cultural Resource Inventory of Western Geophysical Seismic Line 92-3, Section 2, T. 23N, R. 114W, to Section 5, T. 23N, R. 115W. Cultural Resources Report 5002-01-9212. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Kemmerer Resource Area, Kemmerer, Wyoming.
- 1992 (with D. A. Kice) Cultural Resource Inventory near King's Canyon, Millard County, Utah. Cultural Resources Report 5016-01-9234. P-III Associates, Inc., Salt Lake City. Submitted to Utah Division of State History, Antiquities Section, Salt Lake City.
- 1993 (with D. W. Zeanah, B. L. Tipps, and A. D. La Fond) Treatment Plan for Data Recovery at Four Historic Properties in the East Basin, Upper Boulder Creek, Nevada. Cultural Resources Report 489-01-9215. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1993 (with B. L. Tipps) Additional Cultural Resource Inventory Along the Access Road to Kane Springs Federal #10-1 Well, Grand County, Utah. Cultural Resources Report 5015-02-9303. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Grand Resource Area, Moab, Utah, and Utah Division of State History, Antiquities Section, Salt Lake City.
- 1993 Evaluation of Seven Cultural Resource Properties Recorded by Desert Research Institute in or near Barrick Goldstrike's Clydesdale Parcel. Cultural Resources Report 5030-01-9315. P-III Associates, Inc., Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1993 (with A. D. La Fond) Backhoe Trench Monitoring at Sevier Valley Applied Technology Center near Backhoe Village (42SV667), Sevier County, Utah. Cultural Resources Report 5033-01-9318. P-III Associates, Inc., Salt Lake City. Submitted to Utah Division of State History, Antiquities Section, and Division of Facilities and Construction Management, Salt Lake City.
- 1995 (compiler and editor) Open Site Archeology in Little Boulder Basin: 1992 Data Recovery Excavations in the North Block Heap Leach Facility Area, North-Central Nevada. Cultural Resources Report 492-02-9317, Little Boulder Basin Series Number 3. P-III Associates, Inc., Salt Lake City.
- 1995 (with D. K. Newsome) Cultural Resource Inventory of Portions of Access Roads and a Borrow Location in the Oregon Gulch Area, Operable Unit 10, California Gulch, CERCLA Site, Lake County, Colorado. Cultural Resources Report 5058-01-9508. P-III Associates, Inc., Salt Lake City. Submitted to Resurrection Mining Company, Denver.

- 1996 (compiler and editor) Open Site Archeology in Little Boulder Basin: 1993-1994 Data Recovery Excavations in the North Block Tailings Impoundment Area, North-Central Nevada. Cultural Resources Report 5039-01-9601, Little Boulder Basin Series Number 7. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada. Draft.
- 1996 (with B. L. Tipps, R. I. Birnie, S. C. Kenzle, R. E. Walle, and A. D. La Fond) Archaic and Anasazi Archeology in the Sweetwater Area: A Treatment Plan for Data Recovery at Prehistoric Sites Along Navajo Route 35(1), Rock Point to Red Mesa, Apache County, Arizona. Cultural Resources Report 5060-04-9607. Submitted to Navajo Nation Historic Preservation Department, Roads Planning Program, Shiprock Field Office, Shiprock, New Mexico.
- 1997 Data Recovery Excavations at Site 26EK6232, Eureka County, Nevada. Cultural Resources Report 5063-01-9703. P-III Associates, Salt Lake City, Utah. Submitted to Newmont Gold Company, Carlin, Nevada.
- 1997 (with D. E. Tallman) Surface Collection, Mapping, and Testing of Site 26EK5278, Eureka County, Nevada. Cultural Resources Report 5063-02-9716. Little Boulder Basin Series Number 10. P-III Associates, Salt Lake City. Submitted to Newmont Gold Company, Carlin, Nevada.
- 1997 Two Penny Ridge: Numic Occupation Along Boulder Creek, North-Central Nevada. Cultural Resources Report 5063-03-9718. Little Boulder Basin Series Number 11. P-III Associates, Salt Lake City. Draft.
- 1998 (editor and compiler) Open-Site Archeology: 1996 Bootstrap Data Recovery Excavations, North-Central Nevada. Cultural Resources Report 5082-01-9804. Little Boulder Basin Series Number 12. P-III Associates, Salt Lake City. Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.
- 1998 (with J. R. Bright) Class I Cultural Resource Inventory of the Private Fuel Storage Facility Railroad Spur and Intermodal Transfer Point, Skull Valley, Tooele County, Utah. Cultural Resources Report 5117-01-9809. P-III Associates, Salt Lake City. Submitted to Stone and Webster Engineering Corporation, Englewood, Colorado.
- 1999 (with N. J. Coulam) Plant Remains Interpretations and Synthesis; Research Issue 1: Archaic Adaptive Strategies. In Adaptation in a Marginal Environment: The N35(1) Archeology and Ethnography Project, compiled and edited by B. L. Tipps and R. I. Birnie. Cultural Resources Report 5076-02-9801. P-III Associates, Salt Lake City. Submitted to Navajo Nation Historic Preservation Department, Roads Planning Program, Shiprock Field Office, Shiprock, New Mexico. Draft.
- 1999 Field Program for Site Reassessment and Evaluation for the Williams Communication Fiber Optic Line in the Rock Springs Segment, Wyoming. Cultural Resources Report 5125-01-9905. Submitted to Bureau of Land Management, Rock Springs District Office, Rock Springs, Wyoming. 4 pp.

PROFESSIONAL ORGANIZATIONS:

Society of Professional Archeologists
American Anthropological Association
Society for Historical Archeology
Canadian Archeological Association
Society for Archeological Sciences
Society for American Archeology
New York Academy of Sciences
Utah Professional Archeological Council

Arizona Archeological Council
Council of Texas Archeologists
Colorado Archeological Society
North Dakota Archeological Association
South Dakota Archeological Society
Idaho Archeological Society
Montana Archeological Society
Society for Hawaiian Archeology

UNIVERSITY COURSES TAUGHT:

Introduction to Archeology
Introduction to Archeological Science
Introduction to New World Prehistory
Introduction to Cultural Anthropology
General Anthropology
North American Archeology

North American Archeology: Western North
America
Southwestern Archeology
Origins of Civilization
Archeological Method and Theory
Archeological Interpretations of Prehistory

RESUME OF

JOHN DONNELL

JOHN L. DONNELL

Project Manager

EXPERIENCE SUMMARY

Mr. Donnell has 21 years of experience in nuclear project management and engineering. Currently, he is Project Manager for the Private Fuel Storage Facility project. The project is sponsored by a consortium of eleven utilities to develop a central interim storage facility for commercial spent nuclear fuel. In addition, he is the Project Manager for plant modifications work at the Prairie Island Nuclear Generating Plant for Northern States Power Company. His duties as Project Manager includes overall project direction, estimating, contract administration, controlling project costs, and scope change control.

He is also coordinating the corporate Stone and Webster Spent Independent Spent Fuel Storage Installation (ISFSI) Program and supporting all initiatives in this focus area of the power sector. In this capacity, he is responsible for project scoping, staffing, providing estimates, recommending spent fuel storage technology selection, and interfacing with client staff as well as state and federal agencies to support corporate goals for all spent fuel storage projects.

RELEVANT PROJECT EXPERIENCE

Private Fuel Storage LLC, Private Fuel Storage Facility - As Project Manager, responsible for the engineering, design, budget and schedule control for the project. Project scope includes production of all necessary federal licensing documents for submission to the NRC for this first of a kind private fuel storage facility supporting multiple nuclear utilities. The effort also includes site selection and characterization, preliminary facility engineering and design, and related facility and transportation infrastructures. The licensing documents are in compliance with the requirements of 10 CFR Part 72. Detailed engineering and design will follow the licensing effort for the storage facility, support buildings, and transportation system.

Northern States Power Goodhue County ISFSI, Prairie Island Nuclear Generating Plant - As Project Manager, responsible for overall project direction to support the site characterization study, engineering and design, and licensing for this offsite ISFSI. The licensing documents are in compliance with the requirements of 10 CFR Part 72. Duties included:

- Providing support and attending the public forum meetings.
- Participating in the site selection process and ISFSI conceptual design.
- Supervising the development of a storage technology assessment.
- Supervising the development of a storage technology bid specification.
- Supervising the development of the Minnesota State Application for Site Certificate.

He also supervised the development of the NRC License Application, including the preparation of the Safety Analysis Report (SAR), Environmental Report (ER), Emergency Plan (EP), and Security Plan (SP).

Northern States Power, Prairie Island Nuclear Generating Plant ISFSI - As Project Manager and Project Engineer, he was responsible for this project from the preparation of the license application through site operation. Project scope included:

- Generation of federal licensing documents for submission to the NRC. This effort provided the utility with a draft SAR, ER, technical specifications, and decommissioning plan.
- Engineering and design, including site selection, geotechnical studies, security system, cask monitoring system, radiation monitoring system, perimeter shielding berm, facility support

services, road access, cask transporter design review, and procurement support.

He also supervised the auxiliary building crane trolley upgrade to single-failure-proof. This project replaced the existing crane trolley with a single-failure-proof trolley operation to support the movement of the 125-ton spent fuel storage casks within the plant.

Northern States Power Company, Prairie Island Nuclear Generating Plant - As Project Manager, responsible for the overall day-to-day management of all Stone & Webster project activity at this power plant and interface with the utility management team, including departmental and project team members. Programmatic interfaces to the client project team were developed to utilize the best and most appropriate resources from both organizations. Individual task assignments include the development of more than thirty conceptual engineering studies, execution of the engineering and design for more than seventy-four modification tasks, and the preparation of Design Basis Documents.

Portland General Electric Company, Trojan Nuclear Plant - As Project Manager, responsible for all work performed by Stone & Webster at this power plant. Work included:

- Reviewing the decommissioning plan prior to submission to the NRC.
- Performing a facilities review to establish bid evaluation criteria to be used to select the storage technology vendor for an onsite ISFSI.
- Supporting the vendor selection process.
- Preparing a technical report identifying the available storage technologies, operational characteristics, and the implementation of a risk management program for the spent fuel project.
- Performing an evaluation to develop the strategy necessary to terminate the Part 50 License with the loaded ISFSI onsite.

EDUCATION

B.S., Electrical Engineering - University of Toledo

ASME Short Course Program - ASME Boiler & Pressure Vessel Code: Section III, Divisions 1 & 2, Quality Assurance for Design and Inspection of Nuclear Power Plant Components

LICENSES AND REGISTRATIONS

Professional Engineer - Colorado, Ohio, Minnesota