

**ADDRESSING COMMUNITY AND NATURAL RESOURCES POLICY
AS A PART OF SUBSURFACE SCIENCE AT INEEL**

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**Project # UI-001
2000 – 2003**

I. EXECUTIVE SUMMARY

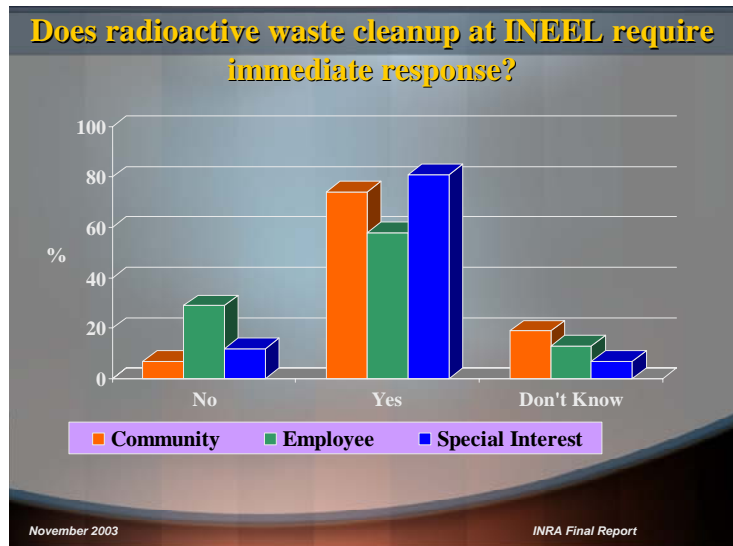
Previous missions and tests related to nuclear materials left a legacy of contaminants as a part of the Idaho National Engineering and Environmental Laboratory (INEEL) landscape. As a result, subsurface science emerged as one of the key programmatic areas within INEEL's mission. This project identified key factors and relationships between INEEL and different sectors of the communities affected by its domain as a management tool for the subsurface science program.

This project spanned a three-year time period, from August 2000 to September 2003. Data collection efforts included qualitative key-informant interviews with 32 individuals, ethnographic observations, and a three-phase survey of different community stakeholder groups. Phase I included a random-sample survey to residents across southeastern Idaho in a 25 county region yielding a 54% response rate (N = 1,861). Phase II administered a similar instrument to random samples of INEEL and Department of Energy (DOE) employees at the Laboratory, yielding 73% (N = 681) and 59% (N = 162) response rates, respectively. Phase III administered a condensed, but similar survey instrument to 93 individuals classified together in a category of "special interests", including elected officials, science workshop participants, advisory council participants, environmental activist groups, representatives of the Shoshone-Bannock Tribal community, and other members of the public at large.

The qualitative and quantitative data analyses suggest several overall results, including:

- ❖ Substantive perceptions of risk among different community groups on a variety of measures related to INEEL operations;
- ❖ Consistent perceived benefits associated with the Lab's location, effect to the regional economy, and scientific contributions within the ongoing mission/s of the INEEL; and
- ❖ Demonstration of concern across groups to address concerns about clean-up in the subsurface within the near-term.

The figure below addresses the latter point, but in many ways, summarizes the key trends found within the data. Results illustrate significant levels of concern as well as support for the Lab as an institution with the expertise and background needed to address contaminant levels in the subsurface vadose zone in between INEEL and the Snake River Plain Aquifer. Although the general public, employees, and special interest groups recognize the Lab's ongoing role in the subsurface cleanup efforts, data collected as a part of this report indicate that issues of trust and fairness also exist within questions different groups have about INEEL operations and procedures. Determination of best management practices for INEEL operations should consider results from these patterns existing within various stakeholder groups with regard to decision-making and social dimensions or risk. These data present a baseline of information to support the need for ongoing disclosure of information, education & outreach, and expansion of opportunities for public involvement as a means to allow engagement on the part of stakeholders that seek additional information.



II. JOINTLY-AUTHORED PUBLICATIONS

Wulfhorst, J.D. and E. Glenn. 2002. "Irrigation, Community, and Historical Development Along the Upper Snake River." *Agricultural History* 72(2):434-47.

Abstract

Control of water remains one of, if not the most enduring natural resource conflicts. Largely due to agriculture, Idaho has one of the highest rates of per capita water consumption in the United States. This paper describes the historical relationships between water and people in the Snake River Plain of southeastern Idaho. Communities in this arid region applied technologies to tap into the Snake River for irrigation. Cultural meanings attached to the irrigated landscape helped shape the social, political, and economic structures of the communities as much as the geo- and hydrological histories. Key themes raised within this paper focus on the social structures and symbolic valuation of water manifested in irrigation settings. Essentially, the infrastructure to manage water along the Snake River is a significant part of the social community because it helps define identity for those who live in and relate to this region.

Summary of Results

Water in southeastern Idaho is an explicitly powerful part of community. The landscape, prior to the irrigation infrastructure established by settlers, did not lend itself to a carrying capacity now inhabiting the Snake River Plain. Succeeding generations have altered and continued to shape the landscape in order to stabilize themselves and make this their environmental and cultural home. The identity formation that has taken place in these communities cannot be separated from the blood, sweat, and tears of the creation of the irrigation system. In essence, the infrastructure is as much a part of the social community as the people because it helps define whom those people are. (*See Appendix A for a full version of this document*).

Glenn, E. and J.D. Wulfhorst. 2004. "Risk Perception Mapping: People and Groundwater Resources On Idaho's Snake River Plain." (Forthcoming in *Society and Natural Resources*)

Abstract

This article provides results of a risk perception mapping project conducted in southeastern Idaho related to Idaho National Engineering and Environmental Laboratory (INEEL) operations and interactions with the region's groundwater resources. The INEEL has a long history of storage, treatment, and disposal of radioactive and other potentially hazardous material. The INEEL's location above the Snake River Plain Aquifer may have implications for contaminant mobility beyond the INEEL site through groundwater interaction. Communities in the surrounding area will likely be the most impacted by any such contaminant migration or perception thereof. Survey results of several risk perception variables are analyzed by sub-regions. Results indicate the presence of a risk perception shadow which expresses a symbolic, if not substantial, difference in where risk becomes officially defined by experts in contrast to where it is perceived by non-experts.

Summary of Results

The regional analysis indicates higher levels of perceived risk, lower levels of benefit, and greater issues of trust/distrust among a geographical area downstream of contamination plumes on-site at the Laboratory. These results support the conceptual existence of a risk perception shadow in southeastern Idaho and expose different definitions of risk between the official/technical information distributed by the INEEL and citizens' perceptions in the region. Experts indicate contamination will *not* move beyond the INEEL site in such a way as to pose risks to the environment or human health. Results reported here indicate that substantial concerns remain among the general population with regard to contamination, but especially among those residents living downstream and perceiving themselves to be at greater risk as a result of proximity to the hydrological flow patterns of the Snake River Plain Aquifer.

III. ALL JOINTLY-AUTHORED PUBLICATIONS – *in press or declined*

Glenn, E. and J.D. Wulfhorst, “Downstream in Time—Environmental Obligations to Future Generations.” Submitted to *Journal of Environmental Ethics* (declined 10/03)

Abstract

The case of the Snake River Plain aquifer and the Idaho National Engineering and Environmental Laboratory (INEEL) are reviewed in the context of the precautionary principle. We pose the question: at what point do our environmental obligations to future generations outweigh the promise of Science, optimism, and technological fixes to address contamination in a preventive mode? We consider the specific case of nuclear waste stored in desert landscapes and discuss implications in the context of the discount rate and catastrophe principle concepts. Philosophical arguments of uncertainty and indeterminacy go beyond caution to emphasize precaution as a means to both prevent depletion of opportunity as well as avoid undue risk in the future. We conclude that although cases of existent contamination already violate the precautionary principle, its consideration in future remediation efforts invokes a more ethical response and socially acceptable tradeoff.

Summary of Results

In the case of the Snake River Plain aquifer, potential threats from subsurface contaminants remain “downstream” in time. Their temporal location, near or far, does not dismiss our obligation and intergenerational relationship to them as a species. Basing our actions on the concept of “intergenerational equity,” we can maintain the rights to use the natural resources around us as well as take on the responsibility of stewardship for those resources. Scientific inquiry today cannot tell us—with certainty—what threats contaminated water in the aquifer pose, if any. Nor is science able to discern how far those threats could reach, in time or in space other than projections as noted in this analysis. Social perceptions, however, clearly indicate a common belief that actions taken in the past and in the present, as well as those perhaps *not taken* in the future, will affect generations not yet born.

IV. LISTING OF ALL JOINTLY-AUTHORED PRESENTATIONS AT NATIONAL/INTERNATIONAL SYMPOSIA

Wulfhorst, J.D. and J. Kamm. “Tribal Sovereignty, Injustice & America’s Nuclear Waste” 2nd Global Conference on Ecological Justice and Global Citizenship, Feb. 13-15, 2003, Copenhagen, Denmark

Abstract

Despite the United States’ recent federal government decision to site a permanent repository at Yucca Mountain in Nevada, high-level nuclear waste management is one of America’s most significant contemporary policy failures. After already more than 20 years and over \$7 billion of research and assessment, experts estimate Yucca Mountain may become operational by 2012 at the earliest. On-site storage of spent fuel rods at many reactors in the United States will allegedly run out in 2007. This leaves a significant gap of time and space within the best case scenario of the current management plan. Currently, storage of high-level nuclear waste occurs at the Idaho National Engineering & Environmental Laboratory (INEEL) given its remote location and infrastructural expertise to manage such wastes. Impacts related to the ongoing storage of these wastes may differ across community groups and should account for historical, cultural, and equity concerns related to the storage site that some perceive could become a default permanent resting ground for radioactive waste given technical complications with the Yucca Mountain and Waste Isolation Pilot Plant (WIPP) in New Mexico. Recent decades have indicated a renaissance movement for Tribal self-determination and –sufficiency although Supreme Court decisions appear to inconsistently favor Tribal interests in recent cases.

Falk, J. and J.D. Wulfhorst. “Philosophic Frameworks for Understanding Time: Cultural Considerations for Inclusive Social Science Research.” 2003 National Conference on Undergraduate Research (NCUR), March 13-15, 2003, Salt Lake City, Utah.

Abstract

Objective: To promote the inclusion of American Indians in social science research regarding the environmental issues many of their communities face. This paper increases knowledge about cultural considerations that ought to be taken into account regarding the use and handling of concepts of time when designing and facilitating research to include under-represented groups.

Delivery Methods: Reporting on direct observations from fieldwork at the reservation headquarters of the Tribe invited to participate in this project. This paper also includes Reporting on personal interviews and meetings with the governing body of the Tribe as well as interpretive information from secondary-sources. Analysis of personal interviews conducted to focus on Tribal representatives in Phase III of a multi-institutional, interdisciplinary research project that seeks to address community and natural resource policy issues related to a national engineering and environmental laboratory.

Evaluation & Impact: Perceptions of risk related to the transportation of waste, intergenerational equity and organizational management deserve attention within rural

communities, but arguably more so in communities disproportionately impacted by technological hazards. Concerns related to perceived risk should be identified among various populations. Often the most difficult barrier in front of identifying these concerns related to perceived risk is willingness on the part of the population to participate in research at all. This paper shows that one major barrier contributing to concern on the part of the subject population about participating in proposed research occurs through the lack of connection between an institutional timeline with Tribal operations and timelines. This paper identifies a lack of flexibility in university-based and research-oriented structures to the varying concepts of time that exist in today's multi-cultured American society. It describes the challenges in cross-cultural community situations where variations in concepts and expectations of time may vary. Identifying these challenges may help develop methods to better connect and involve traditionally excluded groups when gathering social science data in natural resource conflicts.

Falk, J. and J.D. Wulfhorst. "To Include or not to Include—Sensitivity to Cross-Cultural Research in Idaho." 2003 Annual Meeting of the Idaho Academy of Science, April 10-12, 2003, Lewiston, ID.

Abstract

Many American Indian communities lack access to equal resources developed within non-Native society. In spite of the fact that many Indian communities remain underserved in this way, some Tribal representatives opt not to take advantage of every 'opportunity' offered to them for participation in research and development. Many Indian groups over the past 150 years have become wise to question the benefits of proposals they did not develop or have a significant hand in creating. In an era when many rural communities struggle and experience greater and greater limitations on development, what barriers prevent, or lead to, a Tribal community refusing to participate in a new project designed to assist them? This paper describes a recent series of interactions with a Tribe in the Northwest that we approached to invite for participation in a research project. From an academic perspective, the project should include Tribal perspectives on historical and contemporary impacts related to a federal facility that operates within their traditional use areas. To date, Tribal representatives have not arranged a formal agreement to participate in the project even though recent interactions suggest interest on their part. Thus, our paper addresses some of the potential cross-cultural barriers to establishing working relationships with Indian communities in order to include them on relevant research projects.

V. LISTING OF ALL JOINTLY-AUTHORED RESEARCH PROPOSALS

Title: *Social and Cultural Concerns Related to Bioremediation and Chemical Reduction Strategies at DOE Sites (Fall 2000)*

Sponsor: Department of Energy (NABIR-BASIC Program)

Principal Investigators: J.D. Wulfhorst, University of Idaho
Brent Peyton & Jim Petersen, Washington State University
Ron Sims, Utah State University
Al Cunningham, Montana State University

Harold Blackman & Bob Breckenridge, INEEL
Philip Long & Gordon Bilyard, Hanford Site

Summary: Radionuclides and metals resulting from nuclear technology development are present in subsurface environments at multiple DOE sites. Technologies developed to remediate these contaminants have often met with public scrutiny and opposition causing program delays. New technologies—such as bioremediation and chemical reduction—offer technical strategies to manage subsurface contaminants at significantly reduced costs. However, technologies associated with bioremediation and chemical injection may also result in social and cultural concerns related to environmental manipulation. These concerns may differ across various communities and cultural groups such as American Indians living in the regions of potential impact. Data collected through focus groups and panels at INEEL and Hanford will be compared to stakeholder responses at the Oak Ridge National Laboratory site. This project will focus on a comparison of two remediation technologies for metal and radionuclide immobilization: bioremediation (direct microbial reduction) and chemical reduction (dithionite injection).

Funding: **Total = \$586,000**
University of Idaho = \$280,000
Montana State University = \$72,000
Washington State University = \$34,000
Utah State University = \$125,000
INEEL = \$75,000

Status: **Declined**

Title: *Rural Development and the Nuclear Power Renaissance (Fall 2002)*

Sponsor: **USDA-National Research Initiative Competitive Grants Program**

Principal Investigators: J.D. Wulfhorst, University of Idaho
Harold Blackman, John Beller, & Bob Breckenridge, INEEL

Summary: Twenty years ago, new development of nuclear power in the United States ceased. Public concern about perceived risk and economic costs, distrust of managers, technological inconsistencies, and a decentralization of energy policy to state public utilities, all contributed to the turnaround in the growth of nuclear power. U.S. energy consumption, however, is projected to increase by one-third in the next two decades and the federal government has re-energized industrial plans to develop nuclear power. Technological advances in nuclear power claim innovative, safer (Generation III/IV) designs will be available within a few years. Arguably, general public concerns with nuclear power and waste byproducts have not lessened, especially in the era of environmental equity. A major gap exists then in the direction of technology development, emerging federal policy, and

levels of social acceptability. This raises the question: *where will we locate the nuclear power plants projected as the means to meet increasing energy demands?* Development contexts and conditions indicate uneven trends in rural areas—substantial growth in many places that have amenities, and population and economic decline in many key nonmetropolitan counties adjusting to employment loss, increased environmental regulation, aging, and out-migration of youth. Many communities, on the lookout for opportunities to maintain a livelihood, are redefining their surrounding often-remote environments as an asset for industries perceived as high-risk. This proposal asserts that rural and nonmetropolitan community areas in the U.S. will fit the desirable conditions of locations related to future deployment of nuclear power reactors. As such, this proposal falls under the USDA Rural Development research area of “understanding forces and opportunities affecting rural areas.” This proposal anticipates siting criteria such as population density and demographics, political/economic climates, and the environment as likely factors for industry-decision making. In collaboration with the Idaho National Engineering and Environmental Laboratory (INEEL), this proposal outlines an emerging renaissance for nuclear power in the United States, and why it may shift toward less populated areas: global climate change; energy demand levels; Generation III/IV technology; new deployment plans; changing rural development contexts; increasing competitiveness among the nuclear power industry; and current action on nuclear power development. The **purpose** of this seed grant proposal is to develop the preliminary information and tools necessary to complete research on the attributes of community response patterns related to a renaissance of nuclear power. The seed grant **goal** is to: Identify the key attributes involved in a community response matrix for future research design on deployment of nuclear power development in rural areas. **Objectives** for the seed grant include: 1) a technology description; 2) an industry inventory; 3) demographic characterizations of rural and nonmetropolitan communities; and 4) focus group pilot tests at four community study sites to build the structure of a community response matrix.

Funding: **Total = \$73,300**
University of Idaho = \$73,300

Status: **Declined**

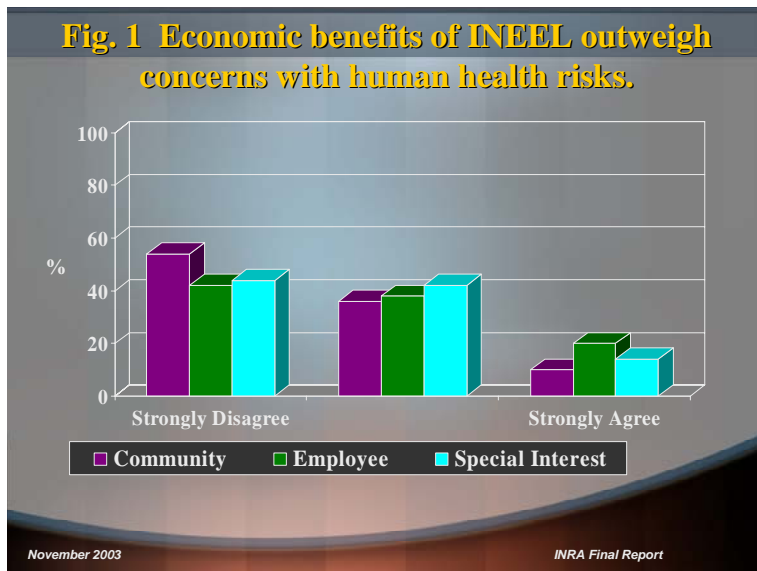
Note: The proposal listed above, “Rural Development and the Nuclear Power Renaissance,” is currently under revision based on reviewers’ comments and recommendations to resubmit for FY05 as a full research proposal. Due to a delay in the USDA-NRI Competitive Grant Program request for applications for federal FY05, the revised proposal will not be submitted until mid-January 2004. Possible award beginning in October 2004.

VI. LISTING OF PATENTS, INVENTION DISCLOSURES, INTELLECTUAL PROPERTY GENERATED FROM PROJECT

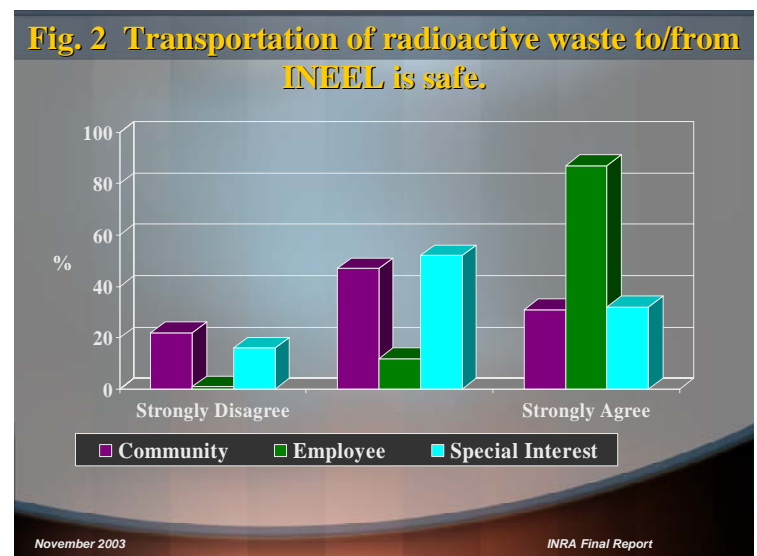
None

VII. SUMMARIES OF OTHER RESULTS NOT REPORTED ABOVE

This section includes several additional summary figures illustrating results from key measures within the quantitative analyses. The pattern of results indicates a tendency among the general public and special interest groups to perceive higher levels of risk than Lab employees:



- Results in Figure 1 indicate a tendency toward greater disagreement with the statement among each of the groups with the strongest response coming from the community sample. The other two groups likely have a greater pre-disposition toward community economic development.



- In results from the safety of transportation measure (Fig. 2), the employee group stands out in much stronger agreement with the statement than the general public and Special Interests groups. Interestingly, the latter two groups are nearly identical in their responses. An array of factors likely explain the differences found here, but one probable factor is level of familiarity with technology (as it relates to perceived risk), which in many cases would be greater among the employees.

- In Fig. 3, the majority of respondents lie in the middle category, not uncommon for this kind of measure. We have seen this across numerous studies in the past decade or more in the Intermountain West—specifically at a variety of facilities that manage

technological risk. In this case, the employees tend to indicate a slightly higher level of trust than the other groups, perhaps for reasons similar to those mentioned before: their social and professional worlds allow them more opportunities for understanding and evaluating the complexities of the *total* INEEL task and environment.

- The last three slides (Fig. 4-6) focus on perceptions of community involvement and actual behaviors associated with participating in INEEL activities. The community responses as to who should be involved in decision-making about waste management and environmental cleanup at INEEL show strong support for involvement among Scientists, the State, and local residents. More ambiguous is the message the community group sent about environmentalists' involvement. This is likely related to the increasing perception among some communities that environmental constituencies are not willing to compromise and have narrow agendas.

- Fig. 5 shows similar results, but from the Employee group response. The same pattern as shown in Fig. 4 is true re: ambiguous support for environmentalists'

Fig. 3 INEEL communicates honestly with people in the region.

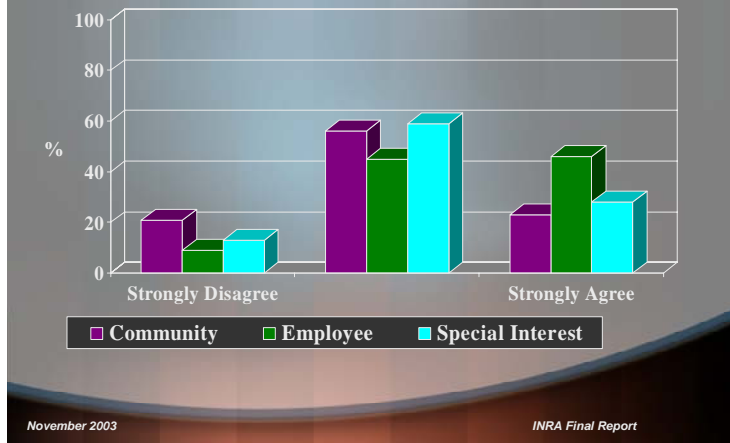


Fig. 4 How involved should these groups be? Community Response

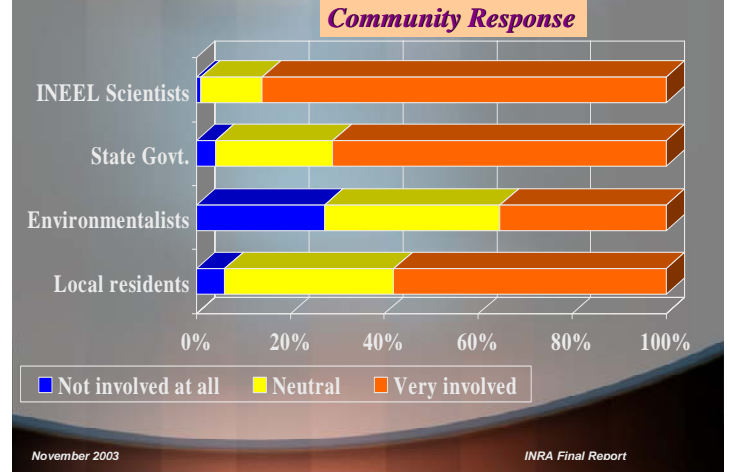
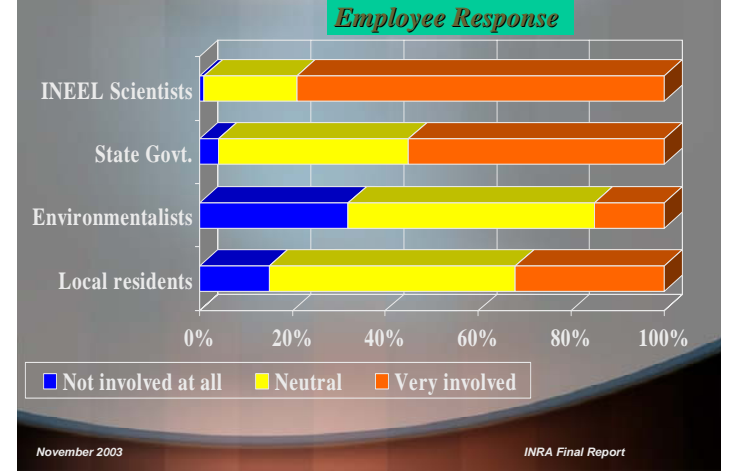
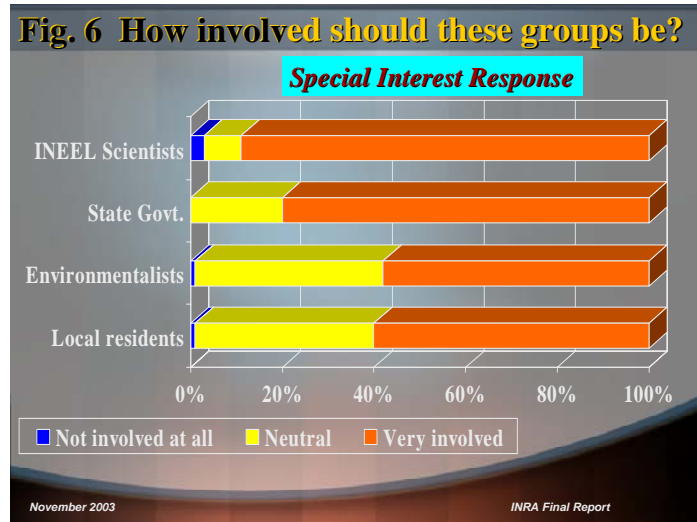


Fig. 5 How involved should these groups be? Employee Response



involvement. Interestingly, although it's not a major percentage level, the employees also indicated over twice the reservation about local residents being involved as did the local residents for INEEL Scientists' involvement.

- However, as seen in Fig. 6, it was nearly universal across the groups to indicate that the INEEL Scientists should be involved.



VIII. STUDENTS/POST-DOCS SUPPORTED

Glenn, Evan (Environmental Science, Law & Policy, M.S.) completed 12/02

- ❖ Committed to on-going participation in research analyses and reporting
- ❖ Currently employed full-time by the U.S. Forest Service, Portland, OR conducting social science research on national forest projects

Kamm, Jennifer (Environmental Science, Law & Policy, M.S.) expected 5/04

- ❖ Committed to on-going participation in research analyses and reporting
- ❖ Currently completing requirements for M.S. at University of Idaho

Falk, Janel (Environmental Science, Law & Policy, B.S.) completed 5/03

- ❖ Committed to on-going participation in research analyses and reporting
- ❖ Currently applying to four law schools for J.D.

IX. SUMMARY OF STUDENT/POST-DOC RESEARCH ACTIVITIES CONDUCTED ON-SITE AT INEEL

Due to a lack of a doctoral program in my home Department (Agricultural Economics & Rural Sociology) over the duration of this project award (2000-2003), no Ph.D. student was eligible to work on this project. The interim Director of INRA (J. Petersen) agreed to have the project support one or more Master's and Undergraduate students assuming

high quality work comparable to the expectations sought by the INRA Request for Proposals.

Three students—Evan Glenn, Jennifer Kamm, and Janel Falk—contributed significantly to the project over the past three years. Summarization of their efforts and accomplishments include the following:

- Forty-six (46) days on-Site and/or conducting fieldwork related to the project;
- 224 direct-contact hours with INEEL staff and scientists;
- Design, creation, & formatting of survey instruments for Phases I thru III;
- Coordination of over 85% of all data collection efforts (including key-informant interviews, observations, and survey administration);
- Lead author and analyst of most of the manuscripts generated thus far from the project data; and
- Draft analyses contributing to comprehensive report forthcoming in 2004.

X. LISTING OF ANY SOLE-AUTHORED (I.E., NOT JOINTLY-AUTHORED) PUBLICATIONS, PRESENTATIONS, PROPOSALS RESULTING FROM THIS PROJECT

Glenn, E. 2001. “Social Reaction to Transuranic Waste Incineration in Southeast Idaho: A New Social Movement Analysis.” Presented at the Annual Meeting of the Rural Sociological Society, Albuquerque, N.M.

Abstract

In April 2000, due to increasing public pressure, the Department of Energy halted plans for the proposed Advanced Mixed Waste Treatment Project (AMWTP) transuranic waste incinerator. The incinerator was one of the proposed means for treating the vast transuranic waste stockpile stored at the Idaho National Engineering and Environmental Laboratory (INEEL) in Southeast Idaho. Significant public opposition to the incinerator had formed in Jackson, Wyoming, about 100-miles East of the INEEL facility. The “community” of those opposed to the incinerator eventually spread over mountains and across state lines, bringing the project to a standstill. This paper presents an in-depth case study of opposition to the AMWTP incinerator, in a new social movement conceptual framework. Relevant demographic information and an investigation of institutional trust will be presented for a more complete understanding of the social dynamic surrounding the incinerator issue.

XI. APPENDICES

- A. “Irrigation, Community, and Historical Development Along the Upper Snake River.”
- B. “Risk Perception Mapping: People and Groundwater Resources On Idaho’s Snake River Plain.” (*Figures attached in Appendix B Supplement*)
- C. “Downstream in Time—Environmental Obligations to Future Generations.”