THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

Professor Michael Greenberg, Associate Dean of the Faculty &
Director, National Center for Neighborhood and Brownfields Redevelopment
Bloustein School of Planning and Public Policy - Rutgers, The State University
33 Livingston Avenue, Suite 100, New Brunswick, New Jersey 08901-1958
Phone: 732/932-4101 ext 673 Fax: 732/932-0934 e-mail mrg@rci.rutgers.edu

May 20, 2001

Andrew R. Grainger
NEPA Compliance Officer
U.S. Department of Energy
Savannah River Operations Office
Building 742A, Room 183
Aiken, South Carolina
Attention: Salt processing EIS
(DOE/EIS-0082-S20)
Subject: Economic Impacts of Salt Processing Facility

Dear Mr. Grainger:

On behalf of the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), I am writing this letter to address the social and economic impacts discussed in this EIS report on pages 4-28 and 4-29.

Enclosed you will find the galley pages of a paper that will shortly be published by the Journal of Environmental Management and Planning. The subject of the paper is the interregional economic impacts of the four alternatives being considered for salt processing at the Savannah River site. This is not the final version of the paper, but the only changes would be final editing for spacing. For the record, the results of the full study from which this paper was drawn were submitted to the DOE Savannah River site. So DOE staff, notably John Reynolds, Thomas Heenan, and Howard Gnann, have seen this work. In fact, without their help, the work would not have been possible.

Briefly, CRESP has a grant from DOE to assist stakeholders by evaluating important issues. This salt processing project was identified by Greg Rudy as an important project and the citizen's advisory group has been receiving briefings and reviewing the options. Two of my doctoral students and I reviewed the engineering documents prepared for the DOE and met with the above-mentioned DOE staff to develop cost estimates. These estimates were then converted and inserted into our regional economic simulation model to produce the results summarized in the paper. These estimates are clearly different from those in the EIS because we spent a lot of time reviewing the plans for the projects, and our model is among the most sophisticated in existence

Comment L12, Page 1 of 17

for converting large-scaled engineering projects into estimates of regional jobs, income and other economic measures. Notwithstanding what I have just said, I must refer you to the statement on page 382 (second full paragraph), in which we note that our estimates are based on initial designs, which I am sure you realize could change dramatically as the technologies are refined and tested. Nevertheless, the method used in the EIS to make the estimates is less than desirable.

With this caveat in mind, I'm going to briefly summarize the key findings of the research in bulleted form:

1. Assuming that the funds for these projects came from new funds added to the DOE budget rather than from any other existing DOE budget item, then job impacts in the region surrounding the Savannah River site during design range from a high of about 2,900 for ion exchange to a low of 1,400 for grout. During construction, the high is 3,750 for caustic to a low of about 2,600 for grout. And during start-up the range is from 2,300 for caustic to 1,200 for grout. L12-1

2. These variations are explained by a number of factors, most notably the different costs of the four technologies; the number of workers and their salary levels; the amount and timing of purchases for building the facilities; and the location of design and testing. All of these are important; however, the last is critical and is the major reason why the caustic and ion exchange technologies do not produce even more local jobs and gross regional product in the host region. In fact, regarding caustic and ion exchange, for the first few years a good deal of the beneficial impact occurs in other regions. L12-2

3. The assumption that the funds for this project will be a net addition to the DOE budget is probably overly optimistic. We provide other options, such as DOE cuts all other budgets (environment, defense, energy research) at all of its sites to pay for this project, DOE cuts only environmental budgets at all of its sites to pay for this project, and DOE takes the money for this project from the Savannah River site budget. The results of those payment options are striking. Table 3 from our paper illustrates them with the small tank option. L12-3 Without doubt, the most distinctive option economically is the one in which the costs for this project are subtracted from other Savannah River site projects. In some years, the host region would suffer a net loss of jobs, because the project is buying equipment, nearly all of which is produced outside the host region. During those years, other regions realize the benefits. Figures 1 and 2 and table 3 illustrate the critically important issue of who pays for the project.

Overall, our study provides more specific estimates than the current EIS, although we reiterate that these numbers will likely change as the technologies are refined. The important points from regional economic theory that apply to the policy decision are that the cost of the project is not the only thing that matters. L12-4 Where the technology is designed and tested is critical, and the type (added, substituted) of funding is likely more important than cost in assessing the socioeconomic impacts.

2

Comment L12, Page 2 of 17

Methodologically, this study demonstrates that we have the ability to estimate the economic impacts on the host and other regions that include DOE sites. So, for example, Table 4 estimates job impacts in other regions as a result of this project. L12-4

We conclude by recognizing that health and safety are the most important drivers of this choice. However, if economic impact is important then the estimates provided in the attached paper should provide a more informative set of results and explanation for the results than those in the current EIS. L12-5

CRESP researchers are extremely interested in the tank wastes and their disposition, and we hope to provide further comments on this important subject in the future.

Regards,

Michael Greenberg
Director, Social and Economic Center, CRESP

cc: Charles Powers

Enclosure: "Regional economic impacts of environmental management of radiological hazards: an initial analysis of a complex problem"

Comment L12, Page 3 of 17

Journal of Environmental Planning and Management, 44(3), 377–390, 2001

Regional Economic Impacts of Environmental Management of Radiological Hazards: An Initial Analysis of a Complex Problem

MICHAEL GREENBERG, DAVID LEWIS & MICHAEL FRISCH

E.J. Bloustein School of Planning and Policy, Rutgers University, 33 Livingston Avenue, Suite 100, New Brunswick, NJ 08901–1958, USA. E-mail: mrg@rci.rutgers.edu

(Received September 2000; revised December 2000)

ABSTRACT *We conducted an economic analysis of four different billion-plus dollar technological options for managing the salt wastes in the high-level waste tanks at the Savannah River nuclear weapons site (SRS) in South Carolina, USA. While US Department of Energy leadership is appropriately most concerned with health, safety and the environment, the economic implications of the choice cannot be dismissed. Combinations of technologies, where the technology is to be designed and tested, and who pays for it, were considered. With the caveat that the engineering designs are not the final versions and are therefore subject to change, we found that the most expensive technologies to design and build may not produce the most jobs or the greatest gross regional product in the SRS region because a great deal of the design and engineering from prototype to testing will not be done in the host region. Furthermore, in terms of the local economic impacts in the SRS region, this analysis shows that the policy choice regarding the method of funding the project (which budget the money comes from) matters as much as the selection of the remediation technology.*

Introduction

High-level waste (HLW) is the by-product of nuclear fuel reprocessing, in which irradiated fuel and target elements from production reactors are dissolved in acids and chemically processed in order to separate the plutonium and uranium from less toxic materials. The management of this waste is daunting because of the toxicity of the materials, the indefinite period of time some of it will need to be managed and the enormous cost of managing it. While health, safety and cost are obviously the primary considerations for the US Department of Energy (DOE), the regional economic impact of environmental management (EM) choices is important to the surrounding regions, which have a half-century-long history of dependence on the DOE.

There is nothing new about economic impact research: when federal government projects are proposed, the agency is required to estimate the number of jobs and dollars added to the regional economy, and these estimates are included as part of an environmental impact and/or socio-economic impact statement. What is new here is that we did not assume that the surrounding

0964-0568 Print/1360-0559 Online/01/030377-14
DOI: 10.1080/09640560120046124

Comment L12, Page 4 of 17

region would necessarily benefit economically from the EM project. Using the region surrounding the Savannah River site (SRS) as the focal point, the purpose of this project was to determine: combinations of technologies; the places where the technologies would be designed, tested, constructed and operated; and sources of funding that would lead to increases in jobs and gross regional product (GRP) and combinations that would not.

EM and Regional Economic Contexts

The management of HLW is arguably the most technologically daunting EM problem facing the USA. The public must not be allowed to come into contact with HLW because a great deal of HLW is extremely toxic, containing radionuclides and hazardous chemical agents. Indeed, the Nuclear Waste Policy Act 1982 (42 USCA) requires permanent isolation of these wastes. Much of the waste has a half-life of 50 years, so it needs to be isolated for 100–400 years. Some of the material, such as plutonium, has a half-life of tens of thousands of years, and we do not know how to prevent exposure to it for many centuries.

Ninety-five per cent of the HLW is stored at over 200 tanks at the Hanford (Washington), and Savannah River (South Carolina) weapons sites (Office of Environmental Management, 1995a). The materials in the tanks are a combination of liquids, sludges and solids. The DOE's radioactive waste management strategy has been to stop building more underground storage tanks and instead to transform the highly radioactive elements of the waste into stable and insoluble solids. Some of the DOE's EM plan has been implemented. For example, the DOE built and has been using a vitrification plant (the Defense Waste Processing Facility) at SRS, which blends the solids and sludges with borosilicate glass at 2100° F into a glass matrix and then places it in stainless-steel canisters (US General Accounting Office (US GAO), 1999; Reynolds, J.M., personal communication). However, the DOE has been unable to successfully demonstrate a technology that will separate the high-level and low-level wastes in the tanks without producing other potentially dangerous conditions that cannot be addressed in an economically efficient way (Stakeholder Focus Group of Citizens Advisory Board, 1998; US GAO, 1999).

After exploring 140 technologies, the DOE is focusing on four options, which are described elsewhere in detail (US Environmental Protection Agency, 1985; Stakeholder Focus Group of Citizens Advisory Board, 1998; Reynolds, 1999; US GAO, 1999; Citizens Advisory Board, 2000): (1) small tank precipitation; (2) grout and caesium encapsulation; (3) crystalline silicotitanate ion exchange and vitrification; and (4) caustic side solvent extraction and vitrification.

DOE policy makers cannot ignore the cost and economic benefits of their EM decisions about HLW, for two reasons. First, the costs of HLW management are enormous by any standard. The DOE estimated the costs of clean-up as part of a two-stage process in which more would be spent during the period 1997–2006 to reduce the overall cost during subsequent years. The post-2006 costs range from $53 billion to $88 billion over 63 years (2007–2070). The HLW portion is $33 billion and $49 billion, i.e. 62% and 56%, respectively (Office of Environmental Management, 1997a, b; Greenberg *et al.*, 1999a). In other words, dealing with HLW will represent the bulk of the so-called 'Cold War mortgage' by the end of environmental risk, the high cost to US taxpayers is one reason for Americans to be concerned about HLW.

Comment L12, Page 5 of 17

The second reason why the DOE cannot ignore the economics of the issue is that EM investments provide a substantial economic benefit to a few regions in the USA. More specifically, the DOE's EM budget has averaged around $6 billion during the 1990s (Frisch & Lewis, 2000). About 70% of the DOE's EM budget is spent at the sites in South Carolina, Washington, Colorado, Idaho and Tennessee (Office of Environmental Management, 1995a, b, c). The EM budgets of the Savannah River and Hanford sites each exceed $1 billion a year. We cannot find any comparable EM investment anywhere in the world. For example, elsewhere we have calculated that the EM budget accounts for 14%, 8% and 17% of the GRP of the regions surrounding the Hanford, Savannah River and Idaho National Engineering and Environmental Laboratory (INEEL) sites (Frisch *et al.*, 1998). Even a modest economic multiplier implies that 15–35% of the economies of these regions is directly and indirectly attributable to the DOE's EM programme. These remarkable proportions are even more salient economic drivers when we consider that defence spending at these sites has plummeted since the end of the Cold War. EM spending has helped compensate for the loss of millions of dollars and jobs that formerly were devoted to developing, building and testing bombs (Greenberg *et al.*, 1999a, b). Studies of news media coverage, interviews with local government officials, including city planners, and a survey of residents of the SRS region all underscore the high priority the local stakeholders attach to the economic impact of the DOE site. In many ways, they consider it as important as EM of the site, and it influences the DOE's credibility (Lowrie *et al.*, 1999, 2000; Williams *et al.*, 1999; Lowrie, 2000).

There are good reasons to be cautious about assuming that any other major on-site project represents a free lunch for the surrounding region that really wants help. One is that these heavily dependent regions have been swinging on an economic pendulum during the last 50 years (Lancaster, 1984; Schill, 1996). Brauer (1995, 1997) argues that the DOE has created a bifurcated labour market in the SRS region, which deters private employers from locating there. Lowrie *et al.* (1999) interviewed 26 local treasurers, comptrollers and chief financial officers in towns and counties near seven major facilities (Oak Ridge, SRS, Hanford, Sandia, Los Alamos, INEEL and Rocky Flats). These sites lost tens of thousands of jobs during the period 1994–99 (Office of Worker and Community Transition, 1999). The picture that emerged was that fluctuating site budgets have caused serious fiscal strains on local governments. Many have sunk money into water and sewer lines, schools and other infrastructure during the period of growth only to find that they are struggling to pay them off as the DOE sites downsize. Many noted that they were not sure that they had sufficient resources to deal with their capital investments, with declining property values and unsold properties, and they questioned their attractiveness to new businesses that would help them diversify their economies (Lowrie *et al.*, 1999).

The 'nuclear mushroom cloud' issue, the most feared toxic symbol, decreases the potential for regional economic development in these regions (Mitchell *et al.*, 1989; Slovic *et al.*, 1991). Regions where bombs were developed, tested and detonated, and where nuclear waste is located, should be expected to suffer from an environmental stigma that would discourage investment and relocation. There is no way of determining how long a stigma effect lingers. There certainly are instances, for example Pittsburgh, Pennsylvania, where the clean-up and redevelopment of an area have led to marked economic growth and the positive

Comment L12, Page 6 of 17

perception of a community. Yet there is no evidence to suggest what are the long-term implications of being a place where nuclear bombs have been detonated and built, and where nuclear waste is stored. In this regard, we can only hypothesize that the more dependent rural sites where bombs have been developed, built and tested (SRS, Hanford and Nevada Test Site) are clearly at a disadvantage with regard to nuclear-related stigma compared with sites where the effort has been largely focused on science and research (Los Alamos and Sandia).

A third reason to be concerned about the regional economic benefits is that the two regions where nearly all the HLW is located have had a rocky economic road in the recent past, and that road is not expected to improve much in the near future. For example, Table 1 shows that the SRS region has the third lowest per capita income of those we studied, and that its regional population and employment increases are estimated to be relatively smaller than those of any of the others. In essence, the SRS region contains rural counties that never recovered from the decline of cotton and the great migration of African Americans to urban centres. In short, the economic implications of the tank waste investment are more important for the SRS region than the same investment would be in other, more populous, growing and affluent regions.

Furthermore, the more DOE-dependent rural sites, such as SRS, are also at a disadvantage with regard to creating local multiplier effects, compared with less dependent and larger, more urbanized ones. For example, the region centred on the Oak Ridge site is much more populated and urbanized than the one surrounding INEEL (Frisch *et al.*, 1998; Greenberg *et al.*, 1999a). An investment in EM at the Oak Ridge site produces more than 50% more jobs than the same investment in more rural Idaho. This result is due to the lack of forward and backward industrial linkages at the more rural locations (Frisch *et al.*, 1998). That is, the DOE allocates funds to site missions, but many purchases take place outside the region, a good deal of the skilled labour has to be brought into the region, and a lot of the research and development and pilot testing does not take place in these rural regions.

Given this context, we focused on circumstances that would notably impact on regional jobs, GRP and income. If research and development, pilot construction and testing occur in the region, if local construction workers are hired and if products (cement and metal bars, etc.) are purchased in the region, then the region will benefit economically. However, if the technology is developed and pilot-tested outside the region, and if workers and products are mostly brought in from outside the region, then the region will benefit relatively little.

In addition to technology choice, the region will benefit maximally if project costs are paid by funds in addition to the site's budget for other intended activities. This scenario would mean that the US public pays through additional taxes, or another government agency pays by having a smaller budget. If the DOE takes money from its budget, then the other DOE site regions will lose jobs and GRP. So this form of payment for the project, in essence, becomes a tax on the other DOE sites and programmes.

To help unravel which regions gain jobs and GRP from EM of the salt wastes in the HLW tanks at SRS, we selected illustrative combinations of technologies, locations for design and testing and methods of funding. These options are described in the five following questions.

Comment L12, Page 7 of 17

Table 1. Study regions

Name of region	States (number of counties)	Metropolitan statistical area	Population (× 1000), 2000	Per capita income ($, × 1000)	Percentage change in employment and population, 2000–15
SRS	Georgia, South Carolina (11)	Augusta–Aiken	647	17.8	Emp. = 11, pop. = 9
Hanford	Washington (7)	Richland–Yakima–Kennewick–Pasco	599	17.7	Emp. = 15, pop. = 13
Oak Ridge	Tennessee (10)	Knoxville	787	20.0	Emp. = 13, pop. = 12
Rocky Flats	Colorado (9)	Denver	2 477	22.9	Emp. = 21, pop. = 24
INEEL	Idaho (7)	Pocatello	248	17.0	Emp. = 22, pop. = 13
Los Alamos/ Sandia	New Mexico (7)	Santa Fe Albuquerque	932	20.4	Emp. = 23, pop. = 27
Pantex	Texas (5)	Amarillo	251	20.4	Emp. = 13, pop. = 13
Nevada Test Site	Nevada, Arizona (4)	Las Vegas	1 447	19.0	Emp. = 30, pop. = 46
Fernald/ Mound	Kentucky, Indiana, Ohio (19)	Cincinnati–Hamilton Dayton	3 057	21.4	Emp. = 17, pop. = 13
Headquarters	DC, Maryland, Virginia, West Virginia (26, including cities)	Washington, DC	4 861	24.4	Emp. = 20, pop. = 17
Rest of USA	—	—	256 988	20.6	Emp. = 16, pop. = 14