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Impact of Providing Off-Site Economic Development Funds to Dependent Regions

Surrounding the U.S. DOE's Major Nuclear Weapons Sites

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ABSTRACT

Using an interregional econometric model, a comparative analysis was made of the economic impacts of providing funds for environmental management, education, and infrastructure to the regions surrounding four of the United States Department of Energy's massive former nuclear weapons sites in Idaho, Tennessee, South Carolina, and Washington. Infrastructure funds were used to build sewers, water lines, roads, bridges and maintain existing infrastructure. Education funds were invested in higher education, primary and vocational schools, books, and libraries. Environmental management funds were invested in on-site remediation. Education produced the most jobs and personal income per dollar of investment, followed by environmental management. Infrastructure, by far, produced the least impact. An important reason for these results is that the relatively small regional economies surrounding these sites are unable to supply the goods and services required for major expansions. Hence, there is considerable leakage of investments to other regions. The limitations of these models to capture feedbacks from investments is emphasized.

In 1989, the U.S. Department of Energy (DOE) acknowledged responsibility for environmental contamination at its former nuclear weapons sites by creating an Office of Environmental Management (EM). The DOE's environmental management budget is the most expensive program aimed at remediating hazardous waste problems in the world. Measured by budget, the DOE program is larger than the U.S. Environmental Protection Agency's Superfund program, the U.S. Department of Defense's program, and all the other federal and state agency hazardous waste management programs.^{1,2} The current EM budget is about \$6 billion a year. The DOE estimates a total expenditure of \$230 billion during the period 1995-2070, with a range of \$200 to \$350 billion for environmental remediation.^{1,3-6} Whatever one thinks about the DOE's past behavior regarding the pollution it created, the amount of money currently allocated and projected to be allocated for EM purposes represents an enormous national commitment to deal with the local environmental legacy of nuclear weapons.

In stark contrast, the DOE has a tiny place-based economic transition program. During the years 1995 and 1996, the DOE spent \$72 million at its major sites.⁷ This compares to about \$12 billion spent on environmental management, or 167 times as much was spent on environmental management.

If the regions surrounding the major weapons sites were economically healthy and not dependent on DOE funding, a tiny economic transition program, or arguably no program, would be appropriate. The U.S. nuclear weapons complex consists of over 130 sites located in cities, towns and rural areas across the United States. The vast majority of these sites are less than 100 acres and contain a few buildings.^{1,3-4} The economic impact of these sites is geographically limited. However, evidence suggests that there is an economic legacy as well as an environmental one at some sites -- that

is, some of the regions surrounding the sites are heavily dependent on DOE funding. Development, testing, and production of nuclear weapons produced over 100,000 jobs as well as environmental contamination on about 20 of the over 130 sites. Four sites in Idaho (Idaho National Engineering and Environmental Laboratory, or INEEL), South Carolina (Savannah River), Tennessee (Oak Ridge), and Washington (Hanford) exemplify the pairing of economic dependency and environmental contamination. (See notes for brief site descriptions.⁸⁾ As context for economic dependency, in 1994, federal spending (in terms of consumption and investment) accounted for 7.4 percent of the gross domestic product of the United States. DOE accounted for an average of 1.1 percent of federal spending. Therefore, DOE accounted for 0.08 percent of federal spending. So any region where DOE spending accounts for more than 0.08 percent of gross regional product should be considered to have a concentration of DOE expenditures. All four regions far exceed the average. Analyses of DOE funding and gross regional product data show that 16, 19, 14, and 16 percent, respectively, of the gross regional products in the areas immediately surrounding the Hanford, INEEL, Oak Ridge, and Savannah River sites were directly attributable to DOE funds. In some cities, towns and boroughs, more than half of the population is supported by the DOE facility.⁹⁻¹³ Substantial economic growth occurred in these four regions during the cold war buildup that began in the middle of the 1970s.¹⁰ But in 1989, the cold war ended, the major nuclear weapons buildup stopped, and the DOE began to dismantle its weapons complex.

While the nuclear weapons mission was ending, an environmental management mission started. The budget for the DOE's environmental management program at the four sites grew from \$1.5 billion in 1990 to 3.2 billion in 1996 (in constant 1992\$). Indeed, these four have received 55 percent of all

DOE environmental management funds throughout the 1990s. Despite the DOE environmental management money, the transition from bombs to environmental management at the four sites has not been smooth. DOE files report that the number of DOE and contractor employees at the four sites fell from 62,000 in 1992, a post-Cold War peak, to 49,000 in 1996. Field studies demonstrate major economic problems developing in the surrounding regions. For example, Brauer compared unemployment rates for the period 1981-1993 in the counties surrounding the INEEL, Savannah River, and Hanford sites with their respective states and a set of counties that had been considered but not chosen as weapons sites.¹⁴ He concluded that the Hanford and Savannah River areas had statistically significant higher unemployment rates than the areas they were compared with and that episodes of high unemployment lasted longer. Hooks and Getz examined the association of federal installations and employment during the period 1970-1990.¹⁵ They concluded that DOE sites seemed to repel growth and asserted that pollution has stigmatized the areas, a finding confirmed by Weida in a study of the attractiveness of the SRS region to new manufacturing employment.¹⁶ The media have widely reported that DOE pays such high wages at some sites that other manufacturing firms were reluctant to locate in the region and had a difficult time keeping their workers when DOE expanded.¹⁷ Finally, U.S. Census data show that the populations surrounding these four sites are relatively poor and are underserved by services, such as public potable water supply systems and sewerage.¹⁸

Given these conditions, it is not surprising that many local residents view environmental management expenditures as a way of supporting these stressed economies. Increases in environmental management budgets are a way of quickening the cleanup and also providing more jobs. However, Russell persuasively argues that using environmental management funds for economic development can

lead the DOE to make inefficient decisions about cleanup priorities and schedules, which costs the American taxpayers money.¹⁹ Furthermore, environmental management investments should gradually decline to a fraction of their present total, so at best environmental management is a way of buying time to build viable local economies. Russell argues for a separate federal fund for economic development that is not tied to environmental management.

The primary purpose of this paper is to examine the local economic impacts of providing off-site place-based funding to the regions surrounding the four major economically dependent and environmentally contaminated nuclear weapons sites. The second purpose is to compare these off-site economic impacts with those from the application of the same amount of on-site environmental remediation funds. The two research questions associated with these purposes were as follows:

1. What is the local impact measured by jobs and personal income of providing funds for typical types of off-site economic development?
2. How do the economic impacts of off-site funds compare with those of on-site environmental management projects?

Before proceeding, the reader should know that this research was funded by the U.S. DOE under a cooperative grant to explore issues of importance to local and national stakeholders. It is the concern of the regions, rather than the DOE, which prompted this study. For the record, the DOE did not request this study nor in any other way influence the research question, design or interpretations of the results.

METHODS AND THEIR LIMITATIONS

An econometric model developed by Regional Economic Modelling Inc. (REMI) was constructed for the research. The model uses national forecasts developed by the U.S. Department of Labor as national estimates.²⁰ The county is the building block for the regions in the model. The model is a dynamic representation of the economic relationships among capital stock, final demand, labor supply, output, prices, profits, and wages from the period 1969-1994. The forecasts include measures of economic output, inter-industry detail, multi-regional effects, and a demographic element.^{21,22}

We made eight decisions about the design and application of the model which influence the results. Each of these is discussed. First, we chose four regions to include. The areas surrounding the Hanford, INEEL, Oak Ridge, and Savannah River sites are both heavily dependent on DOE funds and also have received substantial environmental management funds. Specifically, each had at least 14 percent of its gross regional product attributable to the DOE and annually has received at least \$400 million in DOE environmental management funds.

Other sites were also considered for inclusion in the analysis. The Rocky Flats site in Colorado annually receives more than \$400 million in environmental management funds from the DOE. But Rocky Flats is located in the Denver metropolitan region, which has a population of over two million. The DOE funds are important to the local county, but account for less than one percent of the gross regional product of the Denver Metropolitan area. Therefore, the Rocky Flats region was not included. DOE funds account for more than 14 percent of the GRP of the collective of Los Alamos and Sandia regions in New Mexico. But these sites receive much less environmental management funding, so they were not included. In short, the four regions we chose should be the best places to examine the impact of off-site economic redevelopment funds in regions with a major environmental legacy and also heavily

dependent on DOE funds.

The second decision about regions was how to define the precise boundaries of the regions. The DOE facilities in the four study regions were originally located in rural areas. Over the years, urbanization has moved from the nearest cities toward each of the sites. Oak Ridge is now part of a major metropolitan region of 600,000 people. Knoxville, its major city, has a population of 167,000. Smaller metropolitan regions exist at the other three sites. The combined population of the largest cities at the other three sites, Kennewick (Hanford site), Idaho Falls (INEEL), and Augusta (Savannah River), is less than Knoxville. Micro-economic theory suggests that the greater urbanization at the Oak Ridge site will translate into a greater ability to capture indirect and induced effects of federal investments. In other words, the Idaho, South Carolina, and Washington regions were expected to lose more of the investments to outside areas than the Oak Ridge region.

With this context in mind, two methods were considered for defining the regions around the four sites. One was to determine the extent of economic linkage of each county to the nearby weapons site by measuring the residential location of DOE site workers.²³ Unfortunately, residential location data were not available for all the sites. Therefore, we defined the economic regions as any county within 10 miles (16.1 kilometers) of the perimeter of a DOE site. In some of the rural sites this definition means that some counties with relatively little linkage to a DOE facility were included. An advantage of using 10 miles as a distance is that it provides a consistent definition and allows us to measure how off-site effects vary by region over a fixed distance.

The third decision about regions was to build a model that could capture transactions that occur

between the major DOE regions. Conversations with staff at the Savannah River site implied that there are formal transactions between the site-regions. In other words, when the DOE builds or remediates at the Savannah River site some flow of dollars occurs at the other sites. We needed a model capable of capturing transactions between the Savannah River site and Hanford, INEEL and Oak Ridge. In 1996, as previously noted, the four sites received 55 percent of the DOE's environmental management funding. In addition, the DOE has 14 other weapons sites that also have received 28 percent of EM funding from the DOE.^{1,3} We expected that some of these sites, which include Los Alamos and Sandia (NM), and Lawrence Livermore (CA) might also interact with the four major sites. Consequently, the third design decision was to build a model that contains the four regions, an aggregate for these 14 other DOE-site regions, and the rest of the United States. Table 1 shows the final set of regions and counties included in the analysis.

Table 1 about here

The forecasting period was the fourth design issue. REMI provides a baseline forecast from 1995 to 2035. Yet economic conditions are changing so rapidly in the world that long-term forecasts with REMI or any simulation model are dubious. Therefore, we chose the year 2010 as the end of our forecasting period.

The extent of inter-industry detail was a fifth design decision. The model we used has 14-economic sectors: durable products manufacturing; non-durable products manufacturing; mining; construction; transport and public utilities; finance, insurance and real estate; retail trade; wholesale trade; services; agricultural services; state and local government; federal civilian; federal military; and farm. The U.S. Bureau of Economic Analysis, which prepared the data used in REMI, characterizes

employment at these DOE sites by the business of the site contractor. Thus, when DuPont was operating contractor for the Savannah River site, employment at the site was assigned to the inorganic chemical industry, or in the case of our model to non-durable manufacturing. Non-durable manufacturing is also the industrial sector of the major contractors at the other three sites. Hence, in our model non-durable manufacturing is where nearly all of the DOE jobs have been located at the Hanford, INEEL, Oak Ridge, and Savannah River sites. The limitation of the classification used in our simulation model is that there is some non-durable manufacturing unrelated to the DOE site in these regions, and the equations in our models are doubtless distorted by mixing the transactions of the DOE in with them. The only way of avoiding this problem is to develop a model with much greater business sector detail. In the case of REMI, a 53-sector and 172-sector model could have been developed. Either would have reduced this problem. However, cost was prohibitive. Specifically, the model we used costs about \$20,000. The 53-sector model cost about three times as much and the 172-sector model costs about seven times as much.

A sixth decision was to run the simulations without compensation from other federal government programs. Since the DOE EM budget is a tiny part of the overall United States budget, we assumed for purposes of the analyses that the additional funds added to budget do not come from another federal source. However, in these tight budgetary times, new federal spending is typically offset by cuts in spending some place else. Therefore, we also did a second set of runs in which the rest of federal spending as expressed in terms of final demand was cut across the board to pay for the increased regional expenditures in infrastructure, education, and environmental management. In regions that have a military base, for example, we expected to see a measurable, albeit small difference between the

compensated and uncompensated runs.

The seventh decision was to rely on published DOE reports to distribute EM funds for the period 1997-2010.⁴⁻⁶ Historical data for the period 1990-1996 show some changes occur in EM allocations. However, lacking an alternative source or rationale for allocations, we relied on the DOE's internal documents.

The eighth decision was to choose infrastructure and education as the off-site economic development opportunities to test. This pair was chosen based on the literature, interviews in communities and media reports.²⁴⁻³⁵ Infrastructure was allocated in the following proportions: $\frac{1}{4}$ to water and sanitation, including combined services; and $\frac{1}{4}$ to state and local highways.

Education was allocated in two ways. One, called "education," allocated $\frac{1}{3}$ of the investment to colleges and universities, $\frac{1}{3}$ to elementary and secondary schools, and $\frac{1}{3}$ to libraries, vocational and other schools. The second, which we called "education/building," allocated $\frac{1}{4}$ to building education facilities, $\frac{1}{6}$ to college and universities, $\frac{1}{6}$ to elementary and secondary schools, and $\frac{1}{6}$ to libraries, vocational and other schools.

The fourth allocation was to on-site environmental management. Briefly, from historical data at the sites, we divided environmental management into a wage bill and purchases. We used the year 1989-1990, a year when DOE budgets at the sites were increasing, to apportion the purchases. This choice was made because DOE purchasing patterns have varied considerably, and we wanted to add money to the economy in a way that is representative of a growth year rather than an average of years that mixes growth and decline. In other words, this decision reflects a desire to represent the pattern of likely investments. In addition to the four analyses presented in this paper, we did an infrastructure

investment pattern that emphasized new building, rather than maintenance, and a variety of combinations of infrastructure and education spending. The results of these analyses were not markedly distinguishable from those discussed in the paper, so they are not presented.

The actual amount of funding allocated among the four sites was arbitrarily set at 10 percent of the average amount of EM funding allocated to the four sites during the period 1990-1996. Changes of 10 percent or more are common at the sites, and budget increases of 50 percent have occurred during the last quarter century. Yet 50 percent seemed unrealistically high for a United States government regional economic assistance program during the period of time when government spending is carefully scrutinized. Table 2 shows that the annual average EM funds for the four sites is \$2.64 billion. We allocated 10 percent of that total, or \$264 million dollars to the four sites during the period 1997-2010 in direct proportion to the allocations recorded during the period 1990-1996. This means that each year Hanford, Savannah River, INEEL, and Oak Ridge regions received 43, 27, 15, and 15 percent, respectively, of the \$264 million.

Infrastructure, education, and environmental management illustrate economic investment options that theory predicts would have different economic impacts on these four regions. Building bridges, roads, sewer lines and water mains and other types of infrastructure has historically been touted as a way of injecting money into a region. Yet, as a method of bringing jobs and personal income, infrastructure has limitations in relatively small rural regions. Specifically, a good deal of every dollar spent goes to materials and machines purchased from outside the region. The people who are hired to build often must be brought in from other regions. In contrast, investing in education means hiring teachers, aids, buying paper and books, and some construction. Teachers' salaries are also less than

construction workers. Most of the people are local or will become local residents. At the national scale, we used our econometric model to estimate the cost to add an additional education and infrastructure worker. It cost 50 percent more to add an infrastructure job than an education job. Therefore, we expected investments in education to produce more jobs and personal income than infrastructure. We developed the education/building option to test the impacts of hybrid of funding educational practices and building new facilities for education.

RESULTS

Preliminary Tests

Before presenting the answers to the two research questions, we summarize the results of simulations done with and without compensation from other federal programs. The uncompensated runs assume that the additional budgetary resources come from another source outside the model. The compensated runs assume that every one of the \$264 million added to the off-site economic development or on-site DOE EM program comes out of another federal government program. As expected, there were only small differences between the compensated and uncompensated analyses in our four regions of interest. During the period 1997-2000, change in employment decreased an average of less than 10 percent. The difference between the compensated and uncompensated results decline to less than 5 percent by the end of the simulation period. Since the compensated and uncompensated runs are strongly correlated, it is unnecessary to present both sets of results. We present the uncompensated ones and note that the compensated runs produce fewer jobs and less increase in personal income.

Question 1: Regional Economic Impacts of Changes in Infrastructure and Educational

Investments

In the baseline forecast from 1997 to the year 2010, the model implicitly continues current DOE funding patterns levels into the future. We estimated what would happen if 10 percent more were to be added to the region for off-site infra-structure or education. That is, \$264 million is added every year. Changes were modeled to occur between 1996 and 1997 and then to continue throughout the study period. Therefore, the biggest economic impacts are in 1997, which is the first year of the simulations. These impacts decrease during the study period. For example, the gross regional product (GRP) of the Savannah River region is estimated to increase from \$9.7 billion in the year 1997 to \$12.3 billion in the year 2010 (Table 2). The average annual DOE EM budget for the period 1990-96 at the site was \$712 million. The baseline scenario continued \$712 billion as the budget for the entire study period. Hence, the DOE proportion of the regional GRP decreased from 7.3 percent in 1997 to 5.8 percent in the year 2010. In addition to this expected growth and continuation of DOE EM funding, we added another 10 percent of the DOE EM total, or \$71.2 million to the regional GRP in the form of infra-structure or education spending.

Table 2 about here

The GRP estimates in Table 2 do not translate directly into more jobs and personal income because not all the money allocated to a site creates jobs and personal income in the local region. Some funds purchase goods and services outside the regions. In addition, when some of the money is spent locally, it pays the salaries of local employees. This, in turn, further stimulates purchases of goods

and services both locally and outside the region. Table 3 presents the net increases in jobs and personal income in the years 1997 and 2010.

The 10 percent increase in infrastructure is estimated to add 5,700 jobs and \$160 million in personal income in the year 1997 and 4,000 jobs and \$227 million in personal income in the year 2010.

In contrast, the same increase in education adds 10,600 jobs and \$274 million in income in 1997 and 9,300 jobs and \$503 million in personal income in the year 2010. In other words, in the year 1997, 85 percent more jobs and 71 percent more personal income is generated by education than by infrastructure. By the year 2010, this difference is 131 percent for jobs and 122 percent for personal income.

Table 3 about here

The biggest differences in jobs and personal income between infrastructure and education are at the Savannah River and INEEL sites. In 1997, the same investment in education produces about double the number of jobs and almost double the personal income.

The impacts of a combination of education/building falls between the education and infrastructure ones, somewhat closer to education than infrastructure.

Question 2: Comparison of On-Site Environmental Management and Off-Site Options

Table 3 shows that in 1997 the expansion of on-site environmental management activities produces about 15 percent fewer jobs than education but more than 50 percent more jobs than infrastructure. Regarding personal income, EM produces the same personal income as education in 1997 and about 10 percent less in 2010.

To place these estimates in perspective, the ratios of local expenditures across all regions per

job created in 1997 were calculated using the 10 percent increase in funding increment (Table 4).

Regarding education, it costs \$17,700 to produce an additional job in the Oak Ridge region, whereas it costs \$28,400 to create one at INEEL. The costs per job at Savannah River and Hanford were \$24,300 and \$28,100, respectively. These results are consistent with the nature of the surrounding regions. Oak Ridge, the region that produces the most jobs per dollar of investment, has the largest nearby city. INEEL, the least urbanized location, has the lowest job creation per dollar of investment.

Time series of the economic impacts shows the importance of job and income leakage out of these relatively rural regions. The maximum impact at every site occurs in the year 1997. Thereafter, the DOE investment becomes a smaller share of the regional economy. Figure 1 shows that the decline of job impacts slows down and reverses toward the end of the study period. Specifically, looking at the four sites as a single aggregate, the model shows that indirect and induced effects associated with education stop the decline of jobs by the year 2006. Jobs rise between 2006 and 2007. By the year 2010, they are estimated to be at the same level as the year 2003. The decline of direct job impacts from investments in environmental management stop in the year 2008 and start to increase again in 2009 and 2010. In contrast, infrastructure job impacts decline throughout the study period because too much of the investment occurs outside the region.

Regarding individual sites, Oak Ridge, the most urbanized clearly has an advantage in capturing external investments. The Oak Ridge economy captures a sufficient share of the infrastructure investment to stop the job impact decline by the year 2008. By the year 2010, the number of jobs added equals the number in the year 2006. Indirect and induced effects do not balance the losses in direct effects at Hanford and SRS until the year 2010. At INEEL, the least urbanized region,

infrastructure continues to decline throughout the study period to the extent that it overshadows slight rebounding at the other three.

CONCLUSIONS

The finding that off-site investments in education and on-site investments in environmental management produce more jobs and personal income than off-site investments in infrastructure is consistent with theory, as is the finding that the largest metropolitan region, Oak Ridge, captures more of the investments than the other three sites. These results must not be accepted at face value because of the limitations of the data and methods. In this research, we relied on a model that has somewhat limited abilities to capture inter-industry differences. We think a model with many more economic sectors would yield more reliable estimates. As part of our ongoing research, a model has been constructed for the Savannah River site that includes 53 business sectors rather than the 14 used in this study. We assume that the more detailed model will produce more accurate and precise estimates.

A second limitation of the present study is that in order to have a comparable definition of “region” across the four sites, we included some counties that do not substantially benefit from activities at the weapons sites. The new Savannah River regional model has eight sub-regions across the states of Georgia and South Carolina. These regions reflect the collective judgement of our research team, advice from Savannah River Site economic planners, and an analysis of reports prepared by regional stakeholders.

Third, econometric models rely on historical relationships to simulate the future. If the construction of a bridge or water treatment system attracted new business, or a new two-year college

attracted industry, then that history would be captured in the model. But if no new business located, then the model will not predict any will occur when we invest in the regions. In addition, if there was no major infrastructure expansion during the study period, then the model will not predict the location of any new business during the forecasting period. In other words, as readers of this journal are well aware, follow-up studies are needed to determine how investments in infrastructure, education, and environmental management can be used to stimulate new business growth.³³⁻³⁵ We have begun such a study at the four sites and the Rocky Flats site. That study includes an empirical analysis of the types of businesses that are currently found in the region compared to the types of businesses found in regions with similar economic and population characteristics and growth rates during the period 1970 to 1994. The second phase of that study, which will be based on interviews, will focus on the ability of business leaders in the regions to organize coalitions required to compete for new business or grow new business. In other words, we want to determine how prepared the regions are to effectively use off-site investments in infrastructure or education to build viable regional economies.

A fourth limitation of the present study is that we chose education, infrastructure, and on-site environmental management. Each region and jurisdiction within it doubtless have their own ideas of how they want to rebuild their economy.^{24,25,27-30,36-40} Documents from literature and from the regions show that infrastructure and education are at or near the top of priority lists. However, there are exceptions, and as noted above it is essential that objectives studies evaluate the reality of the success of education, infrastructure and other investments in stimulating economic growth. For example, there is considerable public support in the Savannah River region for building facilities that would produce tritium and manage plutonium, in other words, to continue the region's historical nuclear mission. Expansion of recreation is

another popular alternative at some sites. Given our role to assist stakeholders, we are prepared to test the economic impacts of these alternatives, as well as those tested in this study.

The point of all these simulations is not to make a case that the federal government must expand its small economic transition program. Dr. Russell's paper presents the logic behind that policy, and there is already a massive literature that argues for and against government programs to aid defense-dependent regions.^{1,3,9,14-16,24-25,36-40} Our feeling is that credible empirical studies are needed to provide regional interests and federal officials with some idea of what is likely to happen if a government investment program is launched. Overall, our view is that these state-dependent regions need to form a consensual process that will guide them to a realistic image of an economic future. We firmly believe that a necessary step in that evolution is assessing a variety of plausible economic investment strategies. This study is one of a series aimed at examining the advantages and disadvantages of different strategies.

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TABLE 1

Definition of Nuclear Weapons Site Regions Used in the Study

(Region; state; county)

1. Hanford; Washington (WA); Adams, Benton, Franklin, Grant, Yakima
2. Idaho National Environmental Engineering Laboratory (INEEL); Idaho (ID); Bingham, Bonneville, Butte, Clark, Jefferson
3. Oak Ridge; Tennessee (TN); Anderson, Blount, Knox, Loudon, Morgan, Roane
4. Savannah River (SRS); Georgia (GA); Burke, Richmond; South Carolina (SC); Aiken, Allendale, Barnwell
5. Other major DOE sites; includes 43 counties near 14 other weapons sites. The 14 sites are Burlington (IO), Fernald (OH), Kansas City (MO), Lawrence Livermore (CA), Los Alamos (NM), Mound (OH), Nevada Test Site (NV), Paducah (KY), Pinellas (FL), Portsmouth (OH), Rocky Flats (CO), Sandia (NM), Waste Isolation Plant (NM), Weldon Spring (MO).
6. Rest of U.S.; Includes almost 3,000 counties*

*The DOE has over 130 sites. Facilities in over 100 of these 3,000 receive some DOE EM funding.

TABLE 2

Inputs to the Model, DOE EM Site Budgets as a Proportion of Gross Regional Product, 1997-2010

Time period and change in DOE final demand, 92\$ millions	Hanford	INEEL	Oak Ridge	Savannah River	Total of four sites
REMI estimate of regional GRP,					
1997	11,069	3,200	16,242	9,729	40,240
2010	13,870	4,097	21,039	12,332	51,338
DOE EM final demand, baseline annual avg, 1990-96	1,141	402	387	712	2,642
1997 % of Region GRP	10.3	12.6	2.4	7.3	6.6
2010 % of Region GRP	8.2	9.8	1.8	5.8	5.1
Ten percent of DOE final demand	114.1	40.2	38.7	71.2	264.2
1997 % of Region GRP	1.03	1.26	0.24	0.73	0.66
2010 % of region	0.82	0.98	0.18	0.58	0.51

TABLE 3

**Estimated Impact of Adding Ten Percent of DOE EM Budgets to Off-Site Activities on
Four Site-Regions, 1997-2010**

Investment Strategy / Site Region	Hanford	INEEL	Oak Ridge	Savannah River	Total of four sites
Employment baseline, 1997	263086	81071	378503	236022	958682
Personal income baseline, 1997, \$ millions	10213	2771	14657	8510	36151
Infrastructure					
Employment, 1997	2242	777	1232	1447	5698
2010	1702	501	798	1027	4028
Personal income, 1997, \$ millions	67	20	36	37	160
2010	105	25	45	52	227
Education					
Employment, 1997	4014	1429	2190	2932	10565
2010	3666	1206	1846	2585	9303
Personal income, 1997, \$ millions	111	39	61	63	274
2010	218	64	102	119	503
Education/building					
Employment, 1997	3143	1113	1710	2175	8141
2010	2818	912	1387	1898	7015
Personal income, 1997, \$ millions	91	30	49	50	220
2010	174	49	78	91	392
Environmental management,					
Employment, 1997	3366	1163	2082	2353	8964
2010	2991	896	1836	1985	7708
Personal income,					

1997, \$ millions	106	34	70	64	274
2010	187	50	114	103	454

TABLE 4

Investments to Create a Local Job, 1997

(\$1,000s)

Additions to:	Hanford	INEEL	Oak Ridge	Savannah River
Education	28.1	28.4	17.7	24.3
Education/building	36.1	36.3	22.6	32.7
Infrastructure	49.3	50.3	30.4	48.2
Environmental management	33.9	34.5	18.6	30.3

NOTES

1. Office of Environmental Management, U.S. Department of Energy. Estimating the Cold War Mortgage, 2 vols. (Springfield, Va. NTIS, DOE/EM-0230, 1995).
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site located about 30 west of Idaho Falls. Most of the site is used for or could be used for grazing. A wide variety of nuclear-related products are found on the site, including the experimental breeder reactor. The Oak Ridge reservation contains former weapons facilities as well as a major DOE laboratory. The 55 square mile site has become a nature preserve, and, in fact, much of it is designated as a National Environmental Research Park. For much longer descriptions, see U.S. Department of Energy, Charting the Course: the Future Use Report. (Washington, D.C.: U.S.DOE, 1996).

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