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Economic Impact of Accelerated Cleanup on 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 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.

"We cannot continue to operate this program the same way as in the past."[1] This statement by Secretary of Energy Federico Pena, signals that the expenditure of billions of dollars a year to remediate the environmental legacy at the nations's 130+ former nuclear weapons site will not continue indefinitely. Alvin Alm, Assistant Secretary for Environmental Management, followed the Secretary's remarks with the statement that comprehensive planning was going to replace site-by-site and year-by-year budget submissions.[2] The DOE's new planning approach, labeled "accelerated cleanup," aims to enhance the efficiency of the cleanup process in the near future in order to reduce costs during the twenty-first century. The authors of the documents assert that efficiency is not going to be accomplished by sacrificing safety.[3]

DOE sites have submitted their initial 10-year cost estimates, and the DOE has aggregated these in its initial set of accelerated planning documents.[3,4] These first set of estimates surely will be refined. In essence, they are working numbers. With that caveat in mind, the accelerated planning documents offer an opportunity to examine the regional economic impacts of the accelerated planning concept.

Immediately noticeable in the documents is the marked reduction in the cost estimates from the DOE's Estimating the Cold War Mortgage.[5] The mid-range cost estimate in the mortgage document was $230 billion (in constant $1995) for the period 1995 to 2020, with a range of $200 to 350 billion. The graphs in the mortgage report showed a gradual decline in funding starting in early in the next century and suggests that 90 percent of projected costs will be completed by the year 2035. The June 1997 accelerated planning documents shows a range between $110 and 156 billion during the period 1997 to 2070.[6] The DOE expects to spend about half of the environmental management expenditures

during the first decade of the accelerated cleanup, and the other half is spread out during the subsequent 63 years.

The economic implications of the DOE's EM expenditures markedly varies by site. In 1995, for example, 21 percent of the funding went to the Hanford (WA) site, 21 percent to the Savannah River site (SC), 10 percent to Oak Ridge (TN), 10 percent to Rocky Flats (CO), 8 percent to the Idaho National Engineering and Environmental Laboratory (INEEL), and 30 percent to all the other DOE EM sites.[7] At the Hanford, INEEL, and Savannah River sites, we estimated that the DOE's EM funds account for 14, 17, and 8 percent, respectively, of the gross regional products.[8] As context for these percentages, 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. 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 DOE-dependent regions during the cold war buildup that began in the middle of the 1970s.[14] But in 1989, the cold war ended, the major nuclear weapons buildup stopped, and the DOE began to dismantle its weapons complex. The EM funds have helped buffer these regions against economic decline, but the economies of some regions clearly have been suffering.[15]

The accelerated cleanup plan will have a marked impact on these dependent regional economies. Accelerated cleanup could cause an initial shock in response to additional funds, and a

decade later certainly could cause a much larger shock as a result of a precipitous drop in EM funding. The economies will, in essence, be shocked twice. This paper describes the economic impacts in the areas surrounding the larger sites and the rest of the United States by preparing a baseline economic future and by comparing the baseline to four plausible investment scenarios that combine different on-site environmental management and off-site economic development strategies. The policy goal of the analysis is to stimulate discussion among the DOE, elected officials, and other interest groups .

FIVE PLAUSIBLE ALTERNATIVES

Before presenting the five scenarios, please note that none of these scenarios have any official standing. They were conceived by the authors without input from the DOE or any stakeholder group.

The **"baseline"** option measures the impact of allocating the average of DOE EM dollars during the recent past, 1990-1996, throughout the study period. For example, the Savannah River weapons site received $501 million in 1990 (constant $1992) and 1.12 billion in 1996. The average for the seven year period was $712 million. This amount is allocated throughout the study period. Other baselines were possible, such as trends in funding. However, these were rejected because there is no clear trend at all the sites.

The **"massive shock"** scenario illustrates what might happen if the DOE achieves productivity improvements at the sites and provides no off-site economic funds. For example, the accelerated cleanup plan provides estimates in 1998 dollars of 11.7 billion, or over $1 billion a year, for Savannah River for the period 1998-2006. A total site budget of $9.4 billion is provided for the entire period

2007 to 2070. This was divided by 63 to calculate the average annual estimate for Savannah River of $149 million. Alternatively, we could have gradually decreased the flow of DOE EM dollars rather than abruptly cut them as we did by setting the budget as a annual average. By cutting the budget by $867 million ($1.011 billion in 2006 to $149 million in 2007), there is no way to avoid confronting the impact of the shock. We did not want to gradually reduce the budget by a few percent a year, which, of course, is a policy option but seems inconsistent with the DOE's plans to almost walk away from these sites. In other words, we did not want to use the model to "sugar coat"what could be substantial impacts.

Rocky Flats is a better illustration of what is likely to happen at nearly all the DOE sites. It is scheduled to receive an allocation of $5.1 billion during the period 1998-2006, or an average of over $500 million per year. If the DOE achieves the productivity improvements, the scheduled budget for the period 2007 to 2070 is $600 million or less than $10 million a year. In other words, the DOE literally plans to leave the site. In short, the massive shock alternative doubtless overstates the magnitude of the impact after the accelerated plan ends at Hanford, Savannah River, and the INEEL site. But at other sites the DOE literally hopes to walk away with the exception of monitoring and stewardship functions.

The **"moderate shock"** scenario illustrates what might happen if the DOE achieves only limited productivity improvements at the sites and provides no off-site economic funds. For example, a total site budget of $17.9 billion is provided to Savannah River for the period 2007 to 2070 instead of $9.4 in the productivity enhanced estimate. This was divided by 63 to calculate the average annual estimate for Savannah River of $284 million.

The third and fourth alternatives assume that the DOE's on-site productivity goals are met -- that is, the massive economic shock occurs after the year 2006. Rather than allow the regions to suffer these shocks, federal funds are allocated for offs-site economic development. As context, the DOE has a place-based economic transition program. During the years 1995 and 1996, the DOE spent $72 million at its major sites.[16] This compares to about $12 billion spent on environmental management, or 167 times as much was spent on environmental management.

Russell argues for divorcing the application of DOE's EM funds from the job and income impacts of those funds in order to increase the productivity of the.[17] He calls for a separate federal fund for economic development that is not tied to environmental management. The investments made on behalf of off-site economic development can be viewed as a simulations of what separate off-site investments might look like. There is remarkably little literature on the forms and success rates of economic redevelopment funds.[18] Given the absence of a literature-based standard, we chose simple and easily replicable strategies.

The first of the two investment strategies, labeled **"modest economic redevelopment,"** allocates the difference in EM funds provided in 2006 versus 2007 and allocates it over 10 years beginning in the year 2001. For example, the drop in Savannah River funding was more than $860 million between 2006 and 2007. We added back $86 million a year over the decade. Half of the $86 million was invested in education and half in infrastructure. Specifically, based on the national and local literature-27 the off-site economic development funds were invested as follows: 1/4 to water and sanitation, 1/4 to highways, 1/6 to colleges and universities, 1/6 to elementary and secondary schools, and 1/6 to libraries, vocational and other schools.

The "**moderate economic redevelopment"** scenario is more aggressive. It annually adds 25 percent of the net loss between 2006 and 2007 and begins the investment in the year 1999. For example, this means $216 million is added annually to the Savannah River region budget. In other words, the moderate reinvestment strategy provides the regions a more generous opportunity to create an economic future.

METHODS AND THEIR LIMITATIONS

An econometric model designed by Regional Economic Modelling Inc. (REMI) was built to examine the implications of the five scenarios. The model uses national forecasts developed by the U.S. Department of Labor as national estimates.[28] 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.[29,30]

We made five decisions about the design and application of the model which influence the results. Each of these is discussed. The first decision was choice of regions. The econometric model is built around county units. Aggregates of all counties within 10 miles of surrounding the Hanford, INEEL, Los Alamos/Sandia,[31] Oak Ridge, Rocky Flats, and Savannah River sites constituted six of eight geographical units (Table 1). These sites have received almost 72 percent of DOE environmental management funds. The DOE has other sites 11 which receive about 14 percent of EM funds. We aggregated these to form a seventh unit. The remaining 14 percent of funds are distributed in over 100

other smaller sites and are used by headquarters in Washington. These constituted a "rest of United

A second important decision was to build a model that could capture transactions that occur between the major DOE regions. Conversations with staff at sites 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 dollars flow to Los Alamos, for example. The model enables us to examine flows among the regions.

Table 1 about here

The forecasting period was a second 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 third 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. **Mike, do we need to say something about Los Alamos/Sandia because of their sectors?** 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 fourth decision was to run the simulations with compensation from other federal government programs. Since the DOE EM budget is a tiny part of the overall United States budget, we could assume 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 ran the model in a way that cut federal funds from other programs across the board to pay for changes in expenditures in environmental management, infrastructure and education. 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 fifth decision was how to invest DOE on-site funds for environmental management and off-site funds for economic development. 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. We used 1991-1992, a year when DOE budgets were growing the least to simulate the years after the accelerated stage of the plan is completed. 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.

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 was 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, the first year of the simulations, and these impacts decrease. 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 the in 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 be 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 DOE Savannah Rivers 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. 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.[24,25,27-30,33-37] Documents from literature, and the regions show that infrastructure and education are at or near the top of priority lists. However, there are exceptions. 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.[1,3,9,14-16,24-25,33-37] 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. 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. 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.

hired to build often must be brought in from other regions. Therefore, we expected infrastructure to produce fewer local jobs and personal income per dollar of investment than education.

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. I COULD USE SOME NUMBERS HERE. CAN WE RUN THE MODEL USING REST OF USA. INVEST 50 BILLION IN REST OF USA AND SEE HOW MANY JOBS AND HOW MUCH PERSONAL INCOME WE CREATE? USE THE INFRASTRUCTURE AND EDUCATION OPTIONS. 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.

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TABLE 1

Definition of Nuclear Weapons Site Regions Used in the Study

(Region; state; county)

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1. Hanford; Washington (WA); Adams, Benton, Franklin, Grant, Yakima

2. Idaho National Engineering and Environmental Laboratory (INEEL); Idaho (ID); Bingham, Bonneville, Butte, Clark, Jefferson

3. Los Alamos/Sandia; New Mexico (NM): Bernalillo, Los Alamos, Rio Arriba, Sandoval, Santa Fe

4. Oak Ridge; Tennessee (TN); Anderson, Blount, Knox, Loudon, Morgan, Roane

5. Rocky Flats; Colorado (CO): Boulder, Gilpin, Jefferson

6. Savannah River (SRS); Georgia (GA); Burke, Richmond; South Carolina (SC); Aiken, Allendale, Barnwell

7. Other major DOE sites; includes 36 counties near 12 other weapons sites. The sites are Burlington (IO), Fernald (OH), Kansas City (MO), Lawrence Livermore (CA), Mound (OH), Nevada Test Site (NV), Paducah (KY), Pantex (TX), Pinellas (FL), Portsmouth (OH), Waste Isolation Plant (NM), Weldon Spring (MO).

8. Rest of U.S.; Includes almost 3,000 counties*

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

Table 2

Aggregate Budgets of Five Scenarios

Scenario	Environmental management, 1997-2006	Economic development, 1997-2006	Environmental management, 2007-2010	Economic development, 2007-2010
Baseline	46.6	NA	18.6	NA
Massive shock	48.2	NA	2.8	NA
Moderate shock	48.2	NA	4.7	NA
Modest economic redevelopment	48.2	2.3	2.8	1.4
Moderate economic redevelopment	48.2	7.0	2.8	3.5

NA -none allocated

Make sure I did deflation correctly.

TABLE 3

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	Los Alamos & Sandia	Oak Ridge	Rocky Flats	Savannah River	Rest of DOE	Total of all sites
REMI estimate of regional GRP,								
1997	11,069	3,200		16,242		9,729		
2010	13,870	4,097		21,039		12,332		
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
Massive Shock								
1997 % of Region GRP								
2010 % of region								

Moderate Shock 1997 % of Region GRP 2010 % of region								
Modest economic redevelopment 1997 % of Region GRP 2010 % of region								
Moderate economic redevelopment 1997 % of Region GRP 2010 % of region								

TABLE 4

Estimated Impact of Five Scenarios, 1997-2010

(Difference is from baseline)

Investment Strategy / Site Region	Hanford	INEEL	Oak Ridge	Savannah River	Total
Baseline: Employment 1997 2010 Personal income 1997, $ millions 2010	263086 10213	81071 2771	378503 14657	236022 8510	
Massive shock: Employment 1997 2010 Personal income 1997, $ millions 2010					
Moderate shock: Employment 1997 2010					

Personal income 1997, $ millions 2010					
Modest economic development: Employment 1997 2010 Personal income 1997, $ millions 2010					
Moderate economic development: Employment 1997 2010 Personal income 1997, $ millions 2010					

TABLE 4 ??? Do I want this??

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).

2. M. Russell, E. Colglazier, and M. English, Hazardous Waste Remediation: the Task Ahead. (Knoxville (TN): Waste Management Research and Evaluation Institute, University of Tennessee, 1991)..

3. Office of Environmental Management, U.S. Department of Energy,. Closing the Circle on Splitting the Atom, (Washington, D.C.: U.S.DOE, 1995).

4. U.S. Department of Energy, Baseline Environmental Management Report. (Washington, D.C.: U.S. Government Printing Office, 1995).

5. U.S. Department of Energy, 1996 Update, Baseline Environmental Management Report, (Washington, D.C.: U.S. Government Printing Office, 1996).

6. U.S. Department of Energy. Linking Legacies. (Washington, D.C.: U.S. Government Printing Office, 1997).

7. KAREN CITE

8. The Hanford site is located in south-central Washington just north of the confluence of the Snake and Yakima Rivers with the Columbia River. The site is about 560 square miles of mostly semi-arid greenlands and shrubs. A considerable amount of the most dangerous high-level wastes

are stored at the site. The Idaho National Environmental Engineering Laboratory is a almost 900 square mile 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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