

Appendix J

Additional Supporting Data Related to Socioeconomics and Environmental Justice

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Additional Supporting Data Related to Socioeconomics and Environmental Justice

1 This appendix presents information on the socioeconomic and environmental justice aspects of
2 nuclear power facilities currently in the decommissioning process or that have recently com-
3 pleted the process. It is intended to provide additional support to Sections 4.3.12, "Socioeco-
4 nomic Impacts," and 4.3.13, "Environmental Justice."
5

6 **J.1 Socioeconomic Impacts**

7

8 The information provided in Section 4.3.12, Socioeconomic Impacts, was based, in part, on
9 data obtained from or about facilities that have completed decommissioning and facilities that
10 are currently decommissioning. This data was obtained in the areas of workforce and popula-
11 tion, local tax revenues, and public services. The organization of the information in this section
12 of the appendix reflects the organization of Section 4.3.12.
13

14 **J.1.1 Changes in Workforce and Population**

15

16 Data was gathered on the changes in workforce at facilities that are currently being decommis-
17 sioned where information on operational and decommissioning workforces is available. This
18 information is shown in Table J-1. The table also shows the total population in the host county
19 at the time of plant shutdown, to indicate the potential importance of the facility closure.
20

21 Table J-2 provides the U.S. Census population estimates for the counties that house the plants
22 being decommissioned. This information is used to assess changes in population around the
23 time of shutdown by comparing percentage changes in the county population with State
24 population changes during the same time period.

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Table J-1. Impact of Plant Closure and Decommissioning at Nuclear Power Plants Currently Being Decommissioned

	Nuclear Plant	Thermal Power	Decommissioning Option^(a)	Shutdown Date^(b)	Maximum Workforce	Post-termination Workforce	Maximum Workforce Change	County Population
4	Big Rock Point	240 MW	DECON	08/30/97	--	232	--	24,496 (1997)
5	Dresden, Unit 1	700 MW	SAFSTOR	10/31/78	--	--	--	--
6	Fermi, Unit 1	200 MW	SAFSTOR	09/22/72	--	--	--	--
7	Fort St. Vrain	842 MW	DECON	08/18/89	--	--	--	--
8	GE-VBWR	50 MW	SAFSTOR	12/09/63	--	--	--	--
9	Haddam Neck	1825MW	DECON	07/22/96	--	--	--	--
10	Humboldt Bay, Unit 3	200 MW	SAFSTOR ^(c)	07/02/76	150	60	90	99,692 (1975)
12	Indian Point, Unit 1	615 MW	SAFSTOR	10/31/74	--	--	--	--
13	La Crosse	165 MW	SAFSTOR	04/30/87	82	23	59	25,965 (1987)
14	Maine Yankee	2700 MW	DECON	12/06/96	481	246	235	31,760 (1997)
15	Millstone, Unit 1	2011 MW	SAFSTOR	11/04/95	--	--	--	--
16	Pathfinder	190 MW	SAFSTOR	09/16/67	--	--	--	--
17	Peach Bottom, Unit 1	115 MW	SAFSTOR	10/31/74	--	--	--	--
19	Rancho Seco	2772 MW	SAFSTOR ^(c)	06/07/89	--	200-250	--	--
20	San Onofre, Unit 1	1347 MW	SAFSTOR ^(c)	11/30/92	424	295	129	2,723,782 (1997)
21	Saxton	23 MW	SAFSTOR ^(c)	05/01/72	--	--	--	--
22	Shoreham	2436 MW	DECON	06/28/89	--	--	--	1,303,501 (1989)
23	Three Mile Island, Unit 2	2772 MW	Accident cleanup, followed by storage	03/28/79	1150	125	1125	222,100 (1979)
25	Trojan	3411 MW	DECON	11/09/92	1319	177-432	887-1142	44,513 (1997)
26	Yankee Rowe	600 MW	DECON	10/01/91	--	--	--	--
27	Zion, Unit 1	3250 MW	SAFSTOR	02/21/97	--	--	--	--
28	Zion, Unit 2	3250 MW	SAFSTOR	09/19/96	--	--	--	--

(a) The option shown in the table for each plant is the option that has been officially provided to NRC. Plants in DECON may have had a short (1 to 4 yr) SAFSTOR period. Likewise, plants in SAFSTOR may have performed some DECON activities or may have transitioned from the storage phase into the decontamination and dismantlement phase of SAFSTOR.

(b) The shutdown date corresponds to the date of the last criticality.

(c) These plants have recently performed or are currently performing the decontamination and dismantlement phase of SAFSTOR.

Table J-2. Impact of Plant Closure and Decommissioning on Population Change

Nuclear Plant	Reactor Type	Thermal Power	Decommissioning Option	Location	County	County Population	County Population Change, %	State Pop. Change, %
Big Rock Point	BWR	240 MW	DECON	Charlevoix, MI	Charlevoix	24,496 (1997)	6.5	1.7
Dresden, Unit 1	BWR	700 MW	SAFSTOR	Morris, IL	Grundy	28,400 (1975)	14.9	2.8
Fermi, Unit 1	FBR	200 MW	SAFSTOR	Monroe Co., MI	Monroe	126,300 (1975)	12.7	4.1
Fort St. Vrain	HTGR	842 MW	DECON	Platteville, CO	Weld	130,764 (1979)	18	18
GE-VBWR	BWR	50 MW	SAFSTOR	Alameda Co., CA	Alameda	1,071,446 (1975)	2.6	16.4
Haddam Neck	PWR	1825 MW	DECON	Haddam, CT	Middlesex	149,010 (1997)	4.1	4.2
Humboldt Bay, Unit 3	BWR	200 MW	SAFSTOR	Eureka, CA	Humboldt	99,692 (1975)	9.8	25.8
Indian Point, Unit 1	PWR	615 MW	SAFSTOR	Buchanan, NY	Westchester	874,300 (1975)	-2.7	-3.3
La Crosse	BWR	165 MW	SAFSTOR	Genoa, WI	Vernon	25,965 (1987)	6.1	5.7
Maine Yankee	PWR	2700 MW	DECON	Wiscasset, ME	Lincoln	31,760 (1997)	5.8	2.6
Millstone, Unit 1	BWR	2011 MW	SAFSTOR	Waterford, CT	New London	246,959 (1997)	-0.8	-0.5
Pathfinder	BWR	190 MW	SAFSTOR	Sioux Falls, SD	Minnehaha	95,209 (1975)	12.2	3.4
Peach Bottom, Unit 1	HTGR	115 MW	SAFSTOR	York Co., PA	York	272,603 (1975)	13.8	1
Rancho Seco	PWR	2772 MW	SAFSTOR	Sacramento, CA	Sacramento	869,581 (1989)	8.1	8.3
San Onofre, Unit 1	PWR	1347 MW	SAFSTOR	San Clemente, CA	San Diego	2,723,782 (1997)	9	8.3
Saxton	PWR	23 MW	SAFSTOR	Saxton, PA	Bedford	42,353 (1975)	10.7	1
Shoreham	BWR	2436 MW	DECON	Suffolk County, NY	Suffolk	1,303,501 (1989)	3.1	0.5
Three Mile Island, Unit 2	PWR	2772 MW	Accident cleanup, followed by storage	Middletown, PA	Northampton	222,100 (1979)	9.6	0.2
Trojan	PWR	3411 MW	DECON	Rainier, OR	Columbia	44,513 (1997)	16.5	14.1
Yankee Rowe	PWR	600 MW	DECON	Rowe, MA	Franklin	70,626 (1997)	1.8	1.7
Zion, Unit 1	PWR	3250 MW	SAFSTOR	Zion, IL	Lake	594,799 (1997)	8.3	4.4
Zion, Unit 2	PWR	3250 MW	SAFSTOR	Zion, IL	Lake	594,799 (1997)	8.3	4.4

J.1.2 Local Tax Revenues

More information related to local tax revenues is available for plants that have recently closed than for plants closed more than 10 yrs ago (see Table J-3). The primary taxing authorities for most of the decommissioning plants are the county and city in which the plant is sited. Tax information is typically provided by local taxing authorities (an assessor's office) or from town planners familiar with the tax revenues generated by the plants. Only in the case of Humboldt Bay was tax-impact information available on a smaller, older plant (-\$377,000 in 1983-84). The plants where information is not available are very small plants that most likely had very little impact on the tax base of the community. Many of these plants were shut down in the 1960s and 1970s. In almost every case except Pathfinder, the method used for decommissioning the smaller plants was SAFSTOR.

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1 **Table J-3. Impact on Plant Closure and Decommissioning on Local Tax Revenues**

	Nuclear Plant	Location	Shutdown Date	Thermal Power	Decommissioning Option	Tax Revenues Change, millions (M)	Tax Change, %	Notes
2	Big Rock Point	Charlevoix, MI	08/30/97	240 MW	DECON	--	--	--
3	Haddam Neck	Middlesex, CT	07/22/96	1825 MW	DECON	yr 1 -\$0.7M yr 2 -\$0.7M yr 3 -\$1.3M yr 4 -\$1.2M yr 5 -\$0.5M	-30% (phased out over 5 yrs)	
4	Maine Yankee	Wiscasset, ME	12/06/96	2700 MW	DECON	yr 1 -\$6.3M yr 2 -\$2.5M yr 3 -\$1.1M yr 4 -\$0.6M	-70% (phased out in 4 yrs)	Taxes paid to town. Plant made up about 90% of tax revenue. They have phased out tax expenditure payments over 6-yr period.
5	Millstone, Unit 1	Waterford, CT	11/04/95	2011 MW	SAFSTOR	-\$0.8M	-2% due to plant closure	Impacts to tax revenues in this area during this time include (1) the natural depreciation rate of Unit 1. Assessment had become less than 5% of market value plant by the time of closure. (2) Deregulation environment brings assessed value of plants down 50%.
6	Rancho Seco	Sacramento, CA	6/7/89	2772 MW	SAFSTOR	No Change	0	Rancho Seco was tax exempt because it is considered to be owned by the government. Besides sales tax, etc, no impact.
7	San Onofre, Unit 1	San Clemente, CA	11/30/92	1347 MW	SAFSTOR	yr 1 -\$1.2M yr 2 -\$1.1M yr 3 -\$1.2M		
8	Shoreham	Suffolk Co., NY	06/28/89	2436 MW	DECON	-\$10M/yr up to -\$115M total change after phase-out	10% decrease in yr 1 down to 60% decrease by 2003	This county was hit hard by the abrupt manner in which this plant ceased operation and the lawsuits over tax assessment that proceeded (in which a judge determines assessed value close to 0 based on projected income stream from plant).
9	Three Mile Island, Unit 2	Middletown, PA	03/28/79	2772 MW	Accident cleanup followed by storage	No Change	0	Utilities were tax exempt in 1979.
10	Trojan	Rainier, OR	11/09/92	3411 MW	DECON	yr 1-7 No Change yr 8 -\$2.3M	7.3% reduction for the county as a whole. Loss of 52.6% for one rural fire protection district.	Oregon taxes on the basis of the percentage of capital value of the parent company (ENRON) in county, based on 87% of book value of the parent in state. The Trojan "asset" stayed on ENRON's books until the year 2000.
11	Yankee Rowe	Rowe, MA	10/01/91	600 MW	DECON	-\$0.4M	12% reduction	Rowe has a hydro-electric plant that generates most of the tax revenue (over 75%). This alleviated some of the tax impacts.
12	Zion, Units 1 and 2	Zion, IL	02/21/97/ 09/19/96	3250 MW (each)	SAFSTOR	yr 1 -\$0.4M yr 2 -\$3M yr 3 -\$7M	12% in yr 1, rising to 50% by year 5 (2002)	This is an assessment of both units, together. There is a phase-out approach, where assessed value is reduced from \$210 M to \$10 M over 8 yrs.

18

1 **J.1.3 Public Services**

2
3 The impacts of decommissioning on public services are generally closely related to the
4 tax-related impacts on the community and are affected by the same characteristics of the plant
5 (size and age, tax treatment, and dependence of the local community on plant-related
6 revenues), but not on the choice of decommissioning method or the amount of time between
7 shutdown and active decommissioning. Inquiries were made to local governments in the
8 vicinity of plants undergoing decommissioning about public-service impacts during and after
9 shutdown and decommissioning. Their assessments are shown in Table J-4.

10
11 In general, impacts are SMALL if the existing infrastructure (facilities, programs, and staff)
12 could accommodate any plant-related demand without a noticeable effect on the level of
13 service. MODERATE impacts arise when the demand for service or use of the infrastructure is
14 sizeable and would noticeably decrease the level of service or require additional resources to
15 maintain the level of service. LARGE impacts would result when new programs, upgraded or
16 new facilities, or substantial additional staff are required because of plant-related demand. The
17 impacts were determined for the following public services.

18
19 Education: The NRC considered changes in enrollment in another licensing framework (see
20 *The Generic Environmental Impact Statement for License Renewal of Nuclear Plants*,
21 NUREG-1437 [NRC 1996]) that is useful in the context of decommissioning. In general, SMALL
22 impacts are associated with project-related enrollment increases of 3 percent or less. Impacts
23 are considered small if there is no change in the school systems' abilities to provide educational
24 services and if no changes in the number of teaching staff or classroom space are needed.
25 MODERATE impacts generally are associated with 4 to 8 percent decreases in enrollment.
26 Impacts are considered moderate if a school system must decrease its teaching staff or
27 classroom space even slightly to preserve its preproject level of service. Any decrease in
28 teaching staff, however small (e.g., 0.5 full-time equivalent), that occurs from retiring or laying
29 off personnel or changing the duties of existing personnel (e.g., a guidance counselor assuming
30 classroom duties) may result in moderate impacts, particularly in small school systems.
31 LARGE impacts are associated with project-related enrollment decreases of more than 8
32 percent. Some of the case-study communities had challenges adjusting to the loss of children
33 of the plant staff from the local school systems. For example, some of the local schools had to
34 go on a 4-day week in the Rainier, Oregon, area because loss of enrollment made the schools
35 much more expensive to run per student served.

36
37 Transportation: The U.S. Nuclear Regulatory Commission (NRC) considered transportation
38 issues in another licensing framework (see NUREG-1437 [NRC 1996]) that is useful in the
39 context of decommissioning. That framework considered impacts on the Transportation

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1 **Table J-4. Impact of Plant Closure and Decommissioning on Local Public Services**

	Nuclear Plant	Housing	Education	Transportation	Public Safety	Social Services	Public Utilities	Tourism and Recreation
2								
3	Big Rock Point	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
4	Dresden, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
5	Fermi, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
6	Fort St. Vrain	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
7	GE-VBWR	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
8	Haddam Neck	SMALL to MODERATE	MODERATE	SMALL to MODERATE	MODERATE	SMALL to MODERATE	SMALL	SMALL
9	Humboldt Bay, Unit 3	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
10	Indian Point, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
11	La Crosse	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
12	Maine Yankee	MODERATE	MODERATE	SMALL	MODERATE	SMALL	SMALL	SMALL
13	Millstone, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
14	Pathfinder	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
15	Peach Bottom, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
16	Rancho Seco	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
17	San Onofre, Unit 1	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
18	Saxton	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
19	Shoreham	MODERATE	MODERATE to LARGE	MODERATE	MODERATE	SMALL to MODERATE	MODERATE	SMALL
20	Three Mile Island, Unit 2	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
21	Trojan	SMALL to MODERATE	MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
22	Yankee Rowe	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
23	Zion, Unit 1	SMALL	MODERATE	MODERATE	MODERATE	MODERATE to LARGE	SMALL	SMALL
24	Zion, Unit 2	SMALL	MODERATE	MODERATE	MODERATE	MODERATE to LARGE	SMALL	SMALL

25
 26 Research Board's level of service (LOS) definitions (Transportation Research Board 1985).
 27 LOS is a qualitative measure describing operational conditions within a traffic stream and their
 28 perception by motorists.

29
 30 LOS A and B are associated with SMALL impacts because the operation of individual users is
 31 not substantially affected by the presence of other users. At this level, no delays occur and no
 32 improvements are needed. LOS C and D are associated with MODERATE impacts because
 33 the operation of individual users begins to be severely restricted by other users, and at level D
 34 small increases in traffic cause operational problems. Consequently, upgrading of roads or
 35 additional control systems may be required. LOS E and F are associated with LARGE impacts
 36 because the use of the roadway is at or above capacity level, causing breakdowns in flow that
 37 result in long traffic delays and a potential increase in accident rates. Major renovations of
 38 existing roads or additional roads may be needed to accommodate the traffic flow.

1 Impacts to transportation during the license renewal term would be similar to or less than those
2 experienced during current operations, driven mainly by the workers involved in decommissioning,
3 who are generally fewer in number than the operating staff. Consequently, LOS conditions
4 are likely to move in the direction of A and B at all plants. Based on past and projected impacts
5 at the case study sites, transportation impacts would continue to be of SMALL significance at all
6 sites.

7
8 Public Safety: Impacts on public safety are considered small if there is little or no need for
9 additional police or fire personnel. No disruptions of police and fire-protection services occurred
10 at the case-study sites during the decommissioning period. Existing services were adequate to
11 handle the influx of decommissioning staff, who are less numerous than the operations staff.

12
13 Social Services: The impacts on social services are considered SMALL if no change in the
14 current level of service occurs, MODERATE if service declines noticeably, and LARGE if
15 services are seriously disrupted. Impacts on social services during decommissioning largely
16 depend on the ability of the community to replace the jobs lost at the end of operations or to
17 successfully assist the laid-off workers and other affected workers in the community to
18 transition out of the community. Most of the case-study sites have been able to do this, so the
19 impacts have been SMALL to MODERATE.

20
21 Public Utilities: The NRC considered public utility issues in another licensing framework (see
22 NUREG-1437 [NRC 1996]) that is useful in the context of decommissioning. As in that frame-
23 work, impacts on public-utility services are considered SMALL if little or no change occurs in the
24 ability to respond to the level of demand, and, thus, there is no need to add to capital facilities.
25 Impacts are considered MODERATE if overtaxing of facilities during peak demand periods
26 occurs. Impacts are considered LARGE if existing service levels (such as the quality of water
27 and sewage treatment) are substantially degraded and additional capacity is needed to meet
28 ongoing demands for services. Overall, there have been SMALL impacts on public utilities as a
29 result of decommissioning. The existing capacity of public utilities was sufficient to accommo-
30 date the small influx of decommissioning staff, and some locales experienced a noticeable
31 decrease in the level of demand for services with the completion of plant operations.

32
33 Tourism and Recreation: Few adverse effects have occurred during current operations at
34 the case-study sites, and some positive effects have resulted because taxes paid by the plants
35 and tours of the plants have also increased local tourism. Based on the case-study analysis, it
36 is projected that because decommissioning essentially turns the operating facility back into a
37 construction site while removing tax payments, the impacts of decommissioning should be
38 temporarily adverse and SMALL at all plants. Some positive impact to tourism and recreation
39 also may continue if the plant site is then converted for tourism activities, as planned for Trojan.

J.2 Environmental Justice

Selected socioeconomic indicators are found in Table J-5, for the plants currently in decommissioning status. These include the median county family income as a percentage of State income, and the percentage of minority (nonwhite) persons in the county. This data was used to develop the conclusions that were given in Section 4.3.13, Environmental Justice.

Table J-5. Socioeconomic Indicators Relevant to Environmental Justice at Decommissioning Power Plants

Nuclear Plant	Reactor Type	Decommissioning Option	Public Services Impacts	County Median Family Income (MFI), as % of State MFI	Minority(Non-White) in County, %
Big Rock Point	BWR	DECON	SMALL	79.5	< 7
Dresden, Unit 1	BWR	SAFSTOR	SMALL	107.4	< 3
Fermi, Unit 1	FBR	SAFSTOR	SMALL	110.4	< 5
Fort St. Vrain	HTGR	DECON	SMALL	85.8	11
GE-VBWR	BWR	SAFSTOR	SMALL	110.9	51
Haddam Neck	PWR	DECON	SMALL to MODERATE	103.4	< 9
Humboldt Bay, Unit 3	BWR	SAFSTOR	SMALL	74.8	15
Indian Point, Unit 1	PWR	SAFSTOR	SMALL	148.3	29
La Crosse	BWR	SAFSTOR	SMALL	75.4	< 2
Maine Yankee	PWR	DECON	SMALL to MODERATE	103.1	< 2
Millstone, Unit 1	BWR	SAFSTOR	SMALL	87.9	8
Pathfinder	BWR	SAFSTOR	SMALL	124.2	< 7
Peach Bottom, Unit 1	HTGR	SAFSTOR	SMALL	107.7	< 8
Rancho Seco	PWR	SAFSTOR	SMALL	93.2	36
San Onofre, Unit 1	PWR	SAFSTOR	SMALL	128.3	35
Saxton	PWR	SAFSTOR	SMALL	72.7	< 2
Shoreham	BWR	DECON	SMALL to MODERATE	134.0	15
Three Mile Island, Unit 2	PWR	Accident cleanup, followed by storage	SMALL	109.7	< 9
Trojan	PWR	DECON	SMALL to MODERATE	106.5	< 6
Yankee Rowe	PWR	DECON	SMALL	82.4	< 5
Zion, Unit 1	PWR	SAFSTOR	MODERATE	135.2	20
Zion, Unit 2	PWR	SAFSTOR	MODERATE	135.2	20

J.3 References

U. S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, NRC, Washington, D.C.