SECTION 19.5

ALTERNATIVES

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
10 CFR 20	Title 10 of the Code of Federal Regulations Part 20
^{o}C	degrees Celsius
^{o}F	degrees Fahrenheit
ac.	acre
ADAMS	Agencywide Documents Access and Management System
AHR	aqueous homogeneous reactor
B&W TSG	Babcock & Wilcox Technical Services Group, Inc.
CFR	Code of Federal Regulations
Ci	curie
CLS	Canadian Light Source
cm	centimeter
cm/s	centimeters per second
CP	Construction Permit
DOE	U.S. Department of Energy
ERP	Environmental Repair Program
ft.	feet
GEH	GE Hitachi Nuclear Energy
GIS	Geographic Information System
gpm	gallons per minute
ha	hectare
HEU	highly enriched uranium
HI	health imaging

Acronyms and Abbreviations (cont'd)

Acronym/Abbreviation	Definition
I-131	iodine-131
in.	inch
ISG	Interim Staff Guidance
km	kilometer
kW	kilowatt
L	liter
L/min	liters per minute
LEU	low enriched uranium
LUST	leaking underground storage tank
m	meter
MHA	Maximum Hypothetical Accident
mi.	mile
Mo-98	molybdenum-98
Mo-99	molybdenum-99
Mo-100	molybdenum-100
MURR	University of Missouri Research Reactor
MW	megawatt
NAAQS	National Ambient Air quality Standards
NM	Nuclear Monitor
NorthStar	NorthStar Medical Radioisotopes, LLC
NOx	nitrogen oxides
NRC	U.S. Nuclear Regulator Commission
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places

Acronyms and Abbreviations (cont'd)

Acronym/Abbreviation	Definition
OL	Operating License
PM	particulate matter
SHINE	SHINE Medical Technologies
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPT	Standard Penetration Test
sq.	square
SWRA	Southern Wisconsin Regional Airport
Tc-99m	technetium-99m
TIF	Tax Increment Financing
UM	University of Missouri–Columbia
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UW	University of Wisconsin–Madison
WBN	Wisconsin BrokerNET
WDNR	Wisconsin Department of Natural Resources
WDOR	Wisconsin Department of Revenue
WDOT	Wisconsin Department of Transportation
WDPI	Wisconsin Department of Public Instruction
WGNHS	Wisconsin Geological and Natural History Survey
WNN	World Nuclear News

Acronyms and Abbreviations (cont'd)

Acronym/Abbreviation	Definition
Xe-133	xenon-133

CHAPTER 19

19.5 ALTERNATIVES

19.5.1 NO-ACTION ALTERNATIVE

This section defines the No-Action Alternative and describes the consequences of adopting the No-Action Alternative.

The proposed federal action is the issuance of a Construction Permit (CP) and Operating License (OL) that would allow SHINE Medical Technologies, Inc. (SHINE) to construct and operate a medical SHINE facility to produce molybdenum-99 (Mo-99), iodine-131 (I-131), and xenon-133 (Xe-133). Under the No-Action Alternative, the U.S. Nuclear Regulatory Commission (NRC) would not issue the CP and OL, and the construction and operation of the SHINE facility would not occur. In accordance with the Final Interim Staff Guidance (ISG) Augmenting NUREG-1537, Chapter 19, the environmental consequences of the No-Action Alternative are assumed to be the status quo.

If the SHINE facility were not constructed and operated, the environmental consequences discussed in Section 19.4 would be avoided. The consequences that would be avoided include adverse impacts such as changes in land use; however, as discussed in Section 19.4, the severity of all of the adverse impacts is considered to be SMALL. Because the adverse impacts are not significant, the benefit of avoiding those impacts would also not be significant. In addition, as discussed in Subsection 19.4.7, construction and operation of the SHINE facility produces socioeconomic benefits, such as increases in tax revenues to local jurisdictions. If the SHINE facility were not constructed and operated, these beneficial socioeconomic impacts would not be realized.

In addition to the beneficial socioeconomic impacts discussed in Subsection 19.4.7, the SHINE facility benefits the health of people who need diagnostic tests that require technetium-99m (Tc-99m) and other isotopes. The facility is expected to satisfy approximately half of the annual demand for Tc-99m in the United States, and to provide a more reliable supply of this isotope than currently exists. This represents a significant health benefit. The facility will also produce I-131 and Xe-133, which will have additional health benefits. If the SHINE facility were not constructed and operated, these health benefits would not be realized.

The SHINE facility also produces significant programmatic benefits that would not be realized under the No-Action Alternative. These programmatic benefits are summarized in the following paragraphs.

As discussed in Subsection 19.1.1, there is currently no commercial production of Mo-99, I-131, and Xe-133 in the United States. Reactors outside the United States supply these isotopes. Two of these reactors are more than 50 years old (NRCL, 2009), and both have experienced supply disruptions related to maintenance problems. In addition to age-related maintenance problems, the reliability of the medical isotope supply is further jeopardized by increasing demand, both domestically and globally; by the increasing difficulty of transporting medical isotopes across international borders; and by the short half-life of these medical isotopes. Because of these supply reliability concerns, the U.S. government has a policy to encourage the domestic production of medical isotopes. The SHINE facility makes a significant contribution toward advancing this policy. Under the No-Action Alternative, this benefit would not be realized, in direct

contradiction of the stated policy of the U.S. government to encourage the domestic production of medical isotopes.

The SHINE facility also helps achieve U.S. government nonproliferation objectives. Currently, most medical isotopes are produced by irradiating highly enriched uranium (HEU) targets in non-power reactors fueled with low enriched uranium (LEU).

The United States currently exports HEU for medical SHINE. Congress passed the Energy Policy Act of 1992 (U.S. Government, 1992), which includes a nonproliferation objective to phase out exports of HEU for medical SHINE. Based on this, the U.S. government is encouraging medical SHINE without the use of HEU. The SHINE facility uses LEU to produce medical isotopes, thereby avoiding the use of HEU, reducing the need to ship HEU abroad, and helping to accomplish the nonproliferation objective. Under the No-Action Alternative, this benefit would not be realized.

19.5.2 REASONABLE ALTERNATIVES

This section discusses alternatives to the proposed project as required by the NRC Final ISG Augmenting NUREG-1537. The following types of alternatives are discussed:

- Alternative sites
- Alternative technologies

Both beneficial and adverse impacts are described for the associated environmental resource areas for alternative sites and alternative technologies. The analyses include direct, indirect, and cumulative impacts. Impacts are analyzed in proportion to their significance.

It should be noted that alternative siting within each site is not discussed, because the alternative sites are relatively small and no reasonable arrangement of the SHINE facility components within the site boundaries would avoid or significantly reduce the expected environmental impacts. Modification of existing facilities (versus construction of an entirely new facility) is not discussed, because the SHINE facility is intended to be a new stand-alone facility employing a technology that has not previously been used anywhere in the world. Finally, alternative transportation methods are not discussed, because there are no reasonable alternatives considering the nature of the products that need to be transported from the SHINE facility. Due to the short half-life of Mo-99 (2.75 days), this isotope is normally shipped from the facility to the processing facility by air. Among the other possible products, I-131 has a half-life of 8.0 days, and Xe-133 has a half-life of 5.2 days. Due to their longer half-lives, these isotopes could be shipped by either truck or air. However, since the I-131 and Xe-133 would likely be shipped with the Mo-99 shipments, air shipment is the most reasonable method. (Knolls, 2002)

19.5.2.1 ALTERNATIVE SITES

19.5.2.1.1 Identification of Reasonable Alternatives

This subsection discusses the identification of reasonable siting alternatives for the SHINE facility. The following information is provided:

- Process used to determine reasonable alternatives to the proposed site.
- All alternative sites considered.

- Alternative sites that were eliminated from further study.
- Description of reasonable alternative sites.
- Discussion of any alternative sites considered that would reduce or avoid adverse effects.

The region considered for potential sites was based on SHINE's mission to serve the need for medical isotopes in the United States. In a market where the primary product decays at a rate of 1 percent per hour, being in close proximity to customers is of utmost importance, since minimizing product travel time is key.

When determining potential customers, SHINE considered two scenarios: the near-term scenario, in which SHINE sells Mo-99 and other medical isotopes as an active pharmaceutical ingredient to packagers; and a possible long-term scenario, in which SHINE expands to also package and distribute the isotopes itself. The second, long-term scenario is outside the scope of this license application, but was considered in identifying and evaluating potential sites.

In the near-term scenario, SHINE identified three likely customers: Nordion (Ottawa, Canada), Covidien (St. Louis, Missouri), and Lantheus Medical Imaging (Billerica, Massachusetts). A production site central to these locations minimizes product losses due to decay during shipment.

In addition to these three customers, in the long-term scenario SHINE would be selling directly to consumers. As the hospitals and radiopharmacies that use medical isotopes are located throughout the country, the center of the United States was particularly appealing. Locating on either coast would result in fewer patients being served and therefore reduced social and economic benefits. In general, the Midwest provides a good balance between proximity to currently anticipated customers and customers anticipated in an expansion scenario.

Given the Midwest as a starting point, SHINE proceeded to contact state economic development offices. States to be contacted were chosen based on their location and perceived potential ability to provide financial incentives to the project. SHINE contacted economic development offices in Wisconsin, Minnesota, Ohio, Michigan, and Louisiana. Although Louisiana is not considered part of the Midwest, the potential for high financial incentives prompted SHINE to request information.

No response was received from Ohio or Michigan; therefore, they were eliminated from consideration. A preliminary check of the seismic conditions in Minnesota, Wisconsin, and Louisiana indicated no major fault lines in any of these states, thereby not eliminating any of them from consideration due to seismic activity. After careful analysis of the proposals from Minnesota, Wisconsin, and Louisiana, Wisconsin was chosen for its superior financial incentive package. Of the three states, Wisconsin also has the benefit of being most centrally located with respect to SHINE's three prospective customers (as seen in Figure 19.5.2-1), and being the home state of several project partners, including the University of Wisconsin—Madison (UW), the Morgridge Institute for Research, and Phoenix Nuclear Labs. Thereby, the states of Minnesota and Louisiana were eliminated from further consideration.

After narrowing the search to the state of Wisconsin, SHINE identified four communities that met certain basic requirements for the SHINE plant. In the initial consideration process, the communities were required to have build-to-suit land available for development with good access to an interstate highway, and an airport capable of handling aircraft necessary for isotope

distribution within approximately 10 minutes of the potential site. The four communities identified in Wisconsin that met these requirements were:

- Madison
- Chippewa Falls
- Janesville
- Stevens Point

Madison was eliminated from consideration early in the study due to lack of community and local government support. The location of the remaining communities is shown in Figure 19.5.2-2. An approximate parcel size appropriate for the facility was determined and the search for parcels within each of the three remaining communities was limited to sites of comparable size. Each of these communities identified a potential site and prepared an incentive proposal detailing the advantages of their site.

The location of the potential sites is shown in Figure 19.5.2-3. SHINE then proceeded to compare these sites on the basis of the following criteria:

- Local government and community support.
- Financial incentives.
- Size and shape of the proposed parcel.
- Access to a skilled workforce.
- Proximity to potential future customers.
- Proximity to airport.
- Proximity to an interstate highway.
- Anticipated depth to groundwater table.
- Seismic characteristics.
- Presence of endangered resources and wetlands.
- Presence of historic and archaeological resources.

The assessments of these criteria with respect to the potential sites are discussed as follows:

Local government and community support

Local government and community support will be essential to SHINE successfully completing its mission and, therefore, were very important factors in the site selection process. All three communities showed very high interest in the project and were extremely cooperative.

Financial incentives

Financial incentives will also be key to SHINE's success and were thus key to the site selection process. All three communities were competitive with respect to economic incentives, though Janesville and Stevens Point had a slight economic advantage over Chippewa Falls.

Size and shape of the proposed parcel

A greater distance from the facility to the site boundary was considered beneficial, as a greater distance decreases likelihood of adverse impact to the public. The Janesville site, being 90 acres (ac.) (36.4 hectares [ha]) in size and roughly square, had the largest minimum distance to the site boundary at approximately 1000 feet (ft.) (304.8 meters [m]) in all directions. Stevens Point

proposed an 80 ac. (32.4 ha), square site, roughly on par with the Janesville site minimum distance at just a little under 1000 ft. (304.8 m) in all directions. The Chippewa Falls site, being slightly less than 80 ac. (32.4 ha) and oblong in shape, had a considerably smaller minimum distance to the site boundary in some directions.

Access to a skilled workforce

Two factors were considered when determining access to a skilled workforce: proximity to large cities and the potential cooperation with local universities or technical colleges willing to help train the production facility workforce. With respect to larger cities, Janesville has the advantage of being near Madison, Milwaukee, and Chicago. Chippewa Falls is fairly close to Minneapolis/St. Paul, while Stevens Point is a bit more remote.

Janesville and Stevens Point both have access to universities or technical colleges willing to help train SHINE's workforce: Blackhawk Technical College and UW—Stevens Point, respectively. Workforce training was not offered by local officials at Chippewa Falls.

Proximity to potential customers

Of the three potential locations in Wisconsin, medical isotopes shipped from Janesville had the shortest overall distance to travel to each of SHINE's customers by air.

Proximity to airport

As discussed earlier, efficient product transportation is extremely important in the medical isotope business. The closer the site was to the local airport, the better from this perspective. The Janesville site is directly across from the Southern Wisconsin Regional Airport (SWAR), requiring SHINE's product to travel less than 0.5 mile (mi.) (0.8 kilometer [km]). The Stevens Point site was approximately 4 mi. (6.4 km) from the Stevens Point Municipal Airport. The Chippewa Falls site was approximately 10 mi. (16.1 km) from the Chippewa Valley Regional Airport. The perceived disadvantage of a higher risk of an airplane crash with increased proximity to the airport (no formal analysis was done on the risk of a crash at the alternative sites) is mitigated through design of the facility.

In the case of local airport closure, it is likely that SHINE's product would be transported by truck to the nearest secondary airport. The Janesville site is approximately 1 hour from Dane County Regional Airport in Madison, and within 2 hours of both O'Hare International Airport in Chicago and Mitchell International Airport in Milwaukee. The Chippewa Falls site is within 2 hours of Minneapolis-St. Paul International Airport. The Stevens Point site is more than 2 hours from all of these airports.

Proximity to an interstate highway

In the case of a local airport closure, SHINE would intend to ship its product by truck either to the next closest airport or, depending on the circumstances, directly to the customer. To facilitate ease of transport by truck, close proximity to an interstate highway is desired.

The Janesville site is approximately 3 mi. (4.8 km) by road from I-39/90. The Stevens Point site is less than 2 mi. (3.2 km) by road from I-39, and the Chippewa Falls site is approximately 18 mi. (29.0 km) from I-94.

Anticipated depth to groundwater

Rough approximations of groundwater depth from U.S. Geological Survey (USGS) historical data were taken into consideration. In general, deeper groundwater was considered to be beneficial as deeper groundwater is less likely to impact the facility and vice versa.

The Janesville site is located in Rock County, Wisconsin. Historical wells in counties adjacent to Rock County are between 70 and 100 ft. (21.3 and 30.5 m) deep. Recent measurements down to 30 ft. (9.1 m) found no water and the nearby river elevation is approximately 70 ft. (21.3 m) lower than site elevation. Using this information, groundwater depth at the Janesville site was estimated at greater than 30 ft. (9.1 m). Since then, boreholes and wells drilled on-site have found groundwater at between 55 and 65 ft. (16.8 and 19.8 m) below grade.

Using similar estimation methods, groundwater depth at the Chippewa Falls site was estimated to be at 20 to 30 ft. (6.1 to 9.1 m). Records of an on-site borehole subsequently showed groundwater at approximately 50 ft. (15.2 m) below grade. Groundwater depth at the Stevens Point site was estimated to be at 10 ft. (3.0 m) or less. Since then, boreholes and wells drilled on-site at Stevens Point have found groundwater at about 8 to 11 ft. (2.4 to 3.4 m) below grade.

Seismic characteristics

A preliminary check of the seismic characteristics of each site was made to determine if there were any major advantages or disadvantages between the three. The Janesville site was deemed slightly more likely to have a very weak shaking event than the other two sites; however, both Chippewa Falls and Stevens Point were predicted to be located on glacial sands that might have higher amplification factors than the ground at Janesville. Overall, Janesville was rated slightly preferable from a seismic perspective. Since that time, a geotechnical investigation of the Janesville site has shown glacial deposits at the Janesville site as well.

Presence of endangered resources and wetlands

An Endangered Resources Review by the Wisconsin Department of Natural Resources (WDNR) was requested for all three sites. Because of the Janesville site's current condition as an active agricultural field far from any wetlands, water or buffer areas, it was determined to be an unsuitable habitat for endangered resources likely to be in the area. No conservation or compliance actions were recommended for the site.

Although the Chippewa Falls site was not found to provide suitable habitat for the four Threatened or Special Concern species identified in its vicinity, strict erosion and siltation controls during the entire construction period were recommended to avoid indirect impact to sensitive aquatic species that could be present in the nearby Lake Wissota or Chippewa River. It was also recommended that the small wetland community on the eastern edge of the project site be protected as much as possible to avoid impacting any rare or declining species it may contain.

Like Chippewa Falls, the Stevens Point site was determined to be unlikely to provide suitable habitat for the four Threatened or Special Concern species recorded within the vicinity of the project site. No impacts were expected and no conservation or compliance actions were recommended.

Input from the U.S. Fish and Wildlife Service (USFWS) was also requested for all three sites. No federally-listed, proposed, or candidate species are expected within the project area at either the Janesville or Chippewa Falls sites and neither site contains critical habitat.

A portion of the Stevens Point site was found to be within the high potential range of the Karner blue butterfly (Lycaeides melissa samuelis), a federally-listed endangered species in Wisconsin. A survey for wild lupine (Lupinus perennis), the host plant of the Karner blue butterfly, was recommended. It was also recommended that any disturbance of migratory bird nesting places occur before May 1 or after August 30 to minimize impacts to migratory birds. As the Stevens Point site is mostly wooded and the trees would need to be cleared for the SHINE project, it is likely that some migratory bird nesting places would be disturbed.

Presence of historic and archaeological resources

There was no indication that significant archaeological sites or other cultural resources had been reported on or near any of the sites; however, at the time of the potential site evaluations, none of the sites had been surveyed. Since that time a Phase I archaeaological survey of the Janesville site has been completed. The survey did not identify any pre-contact or historic Euro-American archaeological sites. No additional field work is recommended. No surveys are planned for Stevens Point or Chippewa Falls.

Summary

Each potential site was given a score based on the factors discussed above. These scores are summarized below:

	(Max Score)	Janesville	Stevens Point	Chippewa Falls
Local government and community support	(10)	10	10	10
Financial Incentives	(10)	9	9	8
Minimum distance to site boundary	(5)	5	5	4
Access to a skilled workforce	(5)	4	3	3
Proximity to potential future customers	(5)	5	4	3
Proximity to airport	(5)	5	3	3
Proximity to interstate highway	(5)	4	5	3
Anticipated depth to groundwater table	(5)	5	2	4
Seismic characteristics	(5)	4[(a)]	3	3
Presence of endangered resources and wetlands	(5)	5	2	2
Presence of historic and archaeological resources	(5)	5	5	5
Total:	**65**	**61**	**51**	**48**

a) Based on the geotechnical investigation conducted after site selection was completed, this score would be reduced by one point.

In consideration of these factors, the Janesville site was selected as the proposed site for the SHINE facility. The Chippewa Falls site and the Stevens Point site were both considered to be viable and were identified as reasonable alternatives.

As shown in the summary above, the Janesville site had scores equal to or better than the Chippewa Falls and Stevens Point sites on factors related to environmental impacts. The impact evaluations discussed in Subsection 19.5.2.1.2 subsequently confirmed that neither of the alternative sites would reduce nor avoid adverse effects as compared with the Janesville site.

19.5.2.1.2 Evaluation of Reasonable Alternatives

As discussed in the previous subsection, the Chippewa Falls site and the Stevens Point site are both considered to be viable sites and reasonable alternatives. This subsection describes the alternative sites in more detail, evaluates the major direct, indirect, and cumulative environmental impacts associated with the sites, and describes potential impact mitigation measures that would reduce or minimize adverse impacts.

Information on the Chippewa Falls and Stevens Point sites was obtained through field reconnaissance in the site areas, contacts with appropriate government agencies (federal, state, and local), examination of published maps and aerial photographs, and analysis of digitized Geographic Information System (GIS) mapping data. In order to evaluate the environmental impacts of constructing and operating the SHINE facility, the facility design described in Section 19.2 and the construction and operation practices described in Section 19.4 were

applied to each site. This allowed for a comprehensive and qualitatively-consistent assessment of environmental impacts. The potential impact of facility construction and operation on each resource category specified in the Final ISG Augmenting NUREG-1537 was assigned a significance level according to the criteria established in 10 CFR 51, Appendix B, Table B-1, Footnote 3, as follows:

SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.

LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

For some analyses, it was determined that the additional impact criteria established by the NRC in NUREG-1437 were appropriate, and those criteria were used to assign a significance level to certain impacts, as noted in the subsections below.

In addition to the direct and indirect impacts of the SHINE facility itself, related cumulative impacts from other past, present, and reasonably foreseeable future federal and non-federal projects and activities in the area around each site were considered. The specific environmental resources that could be impacted by the incremental effects of the SHINE facility together with other projects in the vicinity were identified, and the cumulative impacts were assessed.

The following subsections summarize the evaluation of each alternative site.

19.5.2.1.2.1 Chippewa Falls Site

19.5.2.1.2.1.1 Description

The Chippewa Falls site is located in the Wissota Lake Business Park, near the northern edge of the corporate boundaries of the City of Chippewa Falls in Chippewa County, Wisconsin. The site is bordered to the west by Commerce Parkway, to the north by County Highway S, and to the east by State Highway 178. The southern boundary of the site is not defined by any observable landmarks; it is located in a fallow agricultural field at the edge of property that has been platted but not yet developed for the Lake Wissota Business Park. The site boundaries were determined by the City of Chippewa Falls when they recommended the site to SHINE.

The terrain across the site is flat with little noticeable relief other than a gentle slope to the southwest. No residences or other structures are located within the site boundaries. Most of the site is cultivated cropland used for growing corn and soybeans. An abandoned railroad right of way (with the tracks removed) cuts diagonally through the southern portion of the site. South of this right-of-way is a fallow agricultural field, some of which has been graded for use by the Business Park.

Figure 19.5.2-4 shows a conceptual layout of the SHINE facility on the Chippewa Falls site, including the area that would be developed with permanent facility structures, the area that would be temporarily disturbed for construction laydown and parking, and the remaining area within the site boundaries. The area developed with permanent structures occupies part of the abandoned

railroad right-of-way, part of the cropland to the north, and part of the fallow field to the south, while the area temporarily disturbed for construction laydown and parking is located entirely in the cropland. The production facility building, which is the only part of the facility that contains safety-related equipment, is located near the center of the site, positioned so as to maximize the distance to the site boundaries in all directions.

The area within 1 mi. (1.6 km) of the site is a mixture of agricultural land and suburban-type residential and commercial development. The nearest occupied residence is a house located on County Highway S less than 0.1 mi. (0.16 km) northwest of the northern site boundary. Another house is located on County Highway S slightly more than 0.1 mi. (0.16 km) northeast of the site boundary. Several commercial buildings are located along Commerce Parkway less than 0.1 mi. (0.16 km) west of the western site boundary.

The nearest residential concentration is a subdivision located on the north side of County Highway I approximately 0.7 mi. (1.0 km) southwest of the southern site boundary. Other residential concentrations are located within 1 mi. (1.6 km) of the site boundaries to the west, north, and east.

In addition to residences, several other sensitive features are located within 1 mi. (1.6 km) of the site boundaries. These include a hospital, a nursing home, a child day care facility, an adult day care facility, several medical clinics, and two colleges. Table 19.5.2-1 lists the distance to each of these sensitive features from the nearest site boundary and the center point of the safety-related area in the production facility building. Table 19.5.2-1 also lists the distance to the nearest public park, public school, and listed historical property, all of which are more than 1 mi. (1.6 km) from the site boundaries. Figure 19.5.2-5 shows the location of the sensitive features identified within 1 mi. (1.6 km).

U.S. Highway 53, which is located about 5 mi. (8.0 km) west of the site at its nearest point, provides long-distance road access to the site area. The exit nearest to the site is Exit 99 (County Highway S), which is approximately 5 mi. (8.0 km) west of the site. State Highway 178, which borders the site to the east, also provides access to the site area. U.S. Highway 53 and State Highway 178 are well-maintained multi-lane divided highways. The other roads in the immediate site area are well-maintained two- or four-lane roads with paved shoulders.

Chippewa Valley Regional Airport is located approximately 8 mi. (12.8 km) southwest of the site. Aircraft using this airport would be the primary means of transporting isotopes produced by the SHINE facility.

An overhead electrical line and underground natural gas pipeline are located along Commerce Parkway at the western edge of the site. An underground municipal water supply pipeline and sanitary sewer pipeline are located approximately 0.2 mi. (3.2 km) south of the site. It is assumed that if this site were developed, the City of Chippewa Falls would extend the sewer and water utilities to the site boundary.

19.5.2.1.2.1.2 Land Use and Visual Resources Impacts

Existing land use on the Chippewa Falls site is predominantly agricultural, with approximately the northern two-thirds of the site planted in cultivated crops. The abandoned railroad right of way that cuts through the site and the land south of the right-of-way are primarily fallow. Virtually the

entire site is composed of soils classified as prime farmland. No recreational use of the site or the immediate vicinity was identified.

No residences or other structures are located within the site boundaries. The site is zoned for Light Industrial use, as are the adjacent parts of the Wissota Lake Business Park (City of Chippewa Falls, 2011). The City of Chippewa Falls has indicated that a Special Use Permit would probably need to be obtained in order to construct the SHINE facility. A public hearing before the City Council could be required as part of the Special Use Permit application process.

The acreage of each major land use category found within the areas affected by the conceptual facility layout was estimated based on USGS land use/land cover GIS mapping data (USGS, 2006). Table 19.5.2-2 summarizes the acreages in the major land use categories and compares those quantities with the total acreages found within a 5 mi. (8.0 km) radius of the site. It can be seen that the acreage of each land use category potentially affected by the facility layout is less than 1 percent of the total acreage of that category found within 5 mi. (8.0 km).

There is no reason to believe that construction of the SHINE facility would destabilize any important land use resources. Construction would change much of the site from predominantly agricultural use to industrial use, which would noticeably alter the existing land use resources of the site. However, this alteration is consistent with the existing zoning of the site and the intended land use in the Wissota Lake Business Park. Therefore, the land use impact due to project construction would be SMALL.

During operation of the SHINE facility, land use impacts would be reduced. No new land use impacts would occur beyond those described above for project construction, and some areas that were temporarily disturbed for construction laydown and parking might be returned to agricultural use. Therefore, the land use impact due to operation of the SHINE facility would be SMALL.

Visual resources in the vicinity of the site could be affected by the visual intrusion of industrial structures and equipment. During project construction, dust could create additional visual intrusions. Given that the site area currently includes some rural and residential scenery, in addition to institutional, commercial, and industrial scenery, project construction and operation would alter the existing visual conditions somewhat. However, the severity of visual impacts on the human population would depend primarily on the visibility of the project facilities from sensitive viewing areas.

Field reconnaissance and examination of aerial photographs indicate that more than 100 residences are located within 1 mi. (1.6 km) of the site boundaries. As discussed in Subsection 19.5.2.1.2.1.1, the area within 1 mi. (1.6 km) also includes several other sensitive viewing areas, including a hospital, a nursing home, a child day care facility, an adult day care facility, several medical clinics, and two colleges. Although trees and existing buildings would block the view from some of these locations, many would be expected to have at least a partial view of the SHINE facility during construction and operation.

NUREG-1437 establishes the following criteria for judging the severity of aesthetic impacts:

SMALL - No complaints from affected public about a changed sense of place or a diminution in enjoyment of the physical environment, and no measurable impact on socioeconomic institutions and processes.

MODERATE - Some complaints from affected public about a changed sense of place or a diminution in enjoyment of the physical environment, and measurable impacts that do not alter the continued functioning of socioeconomic institutions and processes.

LARGE - Continuing and widely shared opposition to the project based on a perceived degradation of the area's sense of place or diminution in enjoyment of the physical environment, and measurable social impacts that perturb the continued functioning of community institutions and processes.

Considering that the SHINE facility would noticeably alter the appearance of the project site and be at least partially visible from numerous sensitive viewing areas, it is possible that project construction would generate some public complaints related to a changed sense of place and diminished enjoyment of the physical environment. However, it is not likely that there would be "continuing and widely shared opposition" to the project or that there would be "measurable social impacts that perturb the continued functioning of community institutions and processes." Therefore, the visual resources impact associated with project construction would be MODERATE.

Project operation would not result in significant further alteration of aesthetic conditions, and it does not seem likely that there would be continued public complaints related to diminished enjoyment of the physical environment. Therefore, the visual resources impact associated with project operation would be SMALL.

As shown in Figure 19.5.2-4, the conceptual layout of the Chippewa Falls site includes provisions to plant trees along the boundaries of the site that border public roads. These provisions would partially mitigate the visual impact of the project, especially during project operation, and this mitigation is considered in the impact assessment discussed above. No other feasible mitigation measures for land use or visual impacts have been identified.

19.5.2.1.2.1.3 Air Quality and Noise Impacts

The Chippewa Falls site is located in Chippewa County, Wisconsin, which is part of the Southeast Wisconsin - La Crosse (West Central Wisconsin) Interstate Air Quality Control Region (WDNR, 2012a). The ambient air quality in Chippewa County currently is in attainment with the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead) (USEPA, 2012a). The nearest county out of attainment with the NAAQS is Dakota County, Minnesota, which is non-attainment for lead (USEPA, 2012b). Dakota County is located in the Minneapolis-St. Paul metropolitan area, approximately 75 mi. (120 km) west of the Chippewa Falls site. The nearest Wisconsin county out of attainment is Sheboygan County, Wisconsin, which is non-attainment for ozone (USEPA, 2012a). Sheboygan County is located along the western shore of Lake Michigan, approximately 190 mi. (306 km) southeast of the Chippewa Falls site. At these distances and beyond, air pollution emissions from the Chippewa Falls site would not be expected to have any noticeable effect on non-attainment areas.

The air quality impacts of constructing and operating the SHINE facility at the Chippewa Falls site would be very similar to the impacts discussed for the Janesville site in Subsection 19.4.2. Potential air pollution emissions during construction would include dust from earthmoving and material handling activities, and exhaust emissions from construction equipment and vehicles. In general, these emissions would be the same as the emissions associated with any large construction project. Emission-specific control measures, such as watering areas of disturbed soil, would be implemented to limit air quality impacts and ensure compliance with applicable federal and state regulations. Therefore, air quality impacts associated with facility construction would be SMALL.

During facility operation, the SHINE process would emit small quantities of nitrogen oxides. Natural gas firing to heat buildings and occasional testing of the standby diesel generator would emit nitrogen oxides and very small quantities of particulate matter and sulfur dioxide. Standard emission control measures, such as proper mixing of fuels and combustion air, would be implemented to limit air quality impacts. Emissions during facility operation would be governed by applicable air permits, which would ensure compliance with the NAAQS and other applicable regulatory requirements. Therefore, air quality impacts associated with facility operation would be SMALL.

As discussed above, standard emission control measures would be implemented to limit air quality impacts during construction and operation. These measures would ensure that impacts on air quality would be SMALL, and there would be no need for any other air quality impact mitigation measures.

Noise emissions during construction at the Chippewa Falls site would be very similar to the emissions discussed for the Janesville site in Subsection 19.4.2. Based on the depth to bedrock at the Chippewa Falls site (see Subsection 19.5.2.1.2.1.4), blasting and pile driving would not be required for excavation or installation of foundations. The primary source of noise during construction would be the operation of heavy equipment. This noise would be noticeable in the immediate construction area, but it generally would be expected to attenuate to acceptable levels before reaching sensitive receptors. However, vehicular traffic due to construction workers commuting to and from the site and deliveries of equipment and supplies to the site would increase noise levels in the immediate vicinity of several sensitive receptors. It is expected that most project-related traffic would move on Commerce Parkway, County Highway S, and/or County Highway I, and all of these roads have sensitive receptors (residences, medical clinics, day care facilities, a hospital, etc.) in close proximity. It is likely that increased traffic noise would be noticeable at some of these receptors; therefore, noise impacts associated with project construction would be MODERATE.

During operation, project-related traffic would be greatly reduced, and there would be no use of heavy construction equipment on the site. As discussed in Subsection 19.4.2, no significant sources of noise have been identified for project operation. Therefore, noise impacts associated with operation would be SMALL.

As shown in Figure 19.5.2-4, the conceptual layout of the Chippewa Falls site includes provisions to plant trees along the facility access road and the boundaries of the site that border public roads. The layout also would accommodate a low earthen berm around the permanent project facilities. These provisions would be expected to achieve some attenuation of operational noise, and this mitigation is considered in the impact assessment discussed above. No other feasible mitigation measures for noise impacts have been identified.

19.5.2.1.2.1.4 Geology, Soils, and Seismology Impacts

The majority of the surface soils at the Chippewa Falls site consist of Sattre loam derived from glacial outwash materials. The upper 30 inches (in.) (76.2 centimeters [cm]) of the soil horizon is a mixture of sand, silt, and clay with roughly equal proportions of each. Below 30 in. (76.2 cm), sand becomes the predominant constituent (approximately 90 percent) with a substantial increase in the hydraulic conductivity (approximately 0.015 centimeters per second [cm/s]). Soils at the site are generally well-drained and not susceptible to ponding or flooding. Erosion potential of the surficial soils is expected to be slight to moderate. (UW, 1964; NRCS, 2012)

Subsoil information obtained from one boring drilled at the site (American Engineering Testing, 2011) and records of two water wells drilled within 1 mi. (1.6 km) of the site (WGNHS, 2004) corroborate the soils information provided above. The on-site boring log (American Engineering Testing, 2011) also shows an apparently man-made layer of fill material, approximately 3 ft. (0.9 m) thick, at the surface. The fill material was identified as a mixture of sand, gravel, and clay. It is not known how much of the site is covered by this fill material.

Bedrock lies directly beneath the glacial outwash materials and primarily consists of granite (Mudrey, et al., 1982). Karst conditions are not expected in the bedrock (WGNHS, 2012). The single soil boring drilled at the site (American Engineering Testing, 2011) did not encounter bedrock at 82 ft. (25.0 m) below grade, the maximum depth of the boring. Driller's records (WGNHS, 2004) for the two water wells within 1 mi. (1.6 km) show sand and gravel to depths of 50 ft. and 61 ft (15.2 and 18.6 m). The wells were completed within the sand and gravel aquifer, and therefore do not indicate the depth of bedrock. However, a report by the UW (1983) indicates the thickness of unconsolidated materials (soils) as between 100 ft. and 200 ft. (30.5 and 61.0 m), which indicates that the depth to bedrock is 100 ft. to 200 ft. (30.5 and 61.0 m) below grade elevation. As described in Subsection 19.4.3, the maximum depth of excavation required for the SHINE facility is 39 ft. (11.9 m) below grade. Therefore, blasting would not be required for installation of foundations or other construction activities.

The USGS National Seismic Hazard Maps database (USGS, 2012a) indicates the following peak ground accelerations for the Chippewa Falls site area:

- 10-percent probability of exceedance in a 50-year period: 0.78 percent of gravity.
- 2-percent probability of exceedance in a 50-year period: 2.13 percent of gravity.

Based on these values, seismicity in the site area is considered to be minimal. In addition, no significant historical earthquakes have been recorded in the site area or anywhere in Wisconsin (USGS, 2012b), and no Quaternary faults (age less than 1.6 x 106 years) are known to be present in the site area or anywhere in Wisconsin (USGS, 2012c).

The Chippewa Falls site is flat and does not contain landslide hazards. Because the site soils are primarily granular (sand with very little silt and clay) below the upper 30 in. (76.2 cm) of the soil profile, and no underground mining activity has been identified in the site area, land subsidence is not anticipated due to either consolidation of the site soils or local loss of support resulting from underground mining. In addition, no potential for shrink/swell action in response to changes in the moisture content of the soil as related to the stability of shallow foundations is anticipated. Potential for frost heave beneath shallow foundations should also be minimal.

Standard Penetration Test (SPT) blow counts obtained during drilling of the one soil boring on the site indicate that the sand deposits are generally medium dense and not subject to substantial settlement under typical loads applied by shallow foundations. As described in Subsection 19.4.3, the main building for the SHINE facility has a concrete foundation at 39 ft. (11.9 m) below grade, and it should be possible to design this foundation without the need for piles or drilled piers. Due to the low seismicity of the site area and relatively high SPT blow counts, the potential for earthquake induced liquefaction of subsoil below the groundwater table does not need to be considered.

Based on the information summarized above, the geology, soils, and seismology of the Chippewa Falls site would not be expected to have any significant impacts on the SHINE facility. Similarly, construction and operation of the SHINE facility would not be expected to have any significant impacts on the geology, soils, and seismology of the Chippewa Falls site.

There is no indication that any rare or unique rock, mineral, or energy assets are present that could be impacted by development at the site. Mining of sand is being conducted in several locations around Chippewa County (where the Chippewa Falls site is located) for use in hydraulic fracturing associated with natural gas production (USGS, 2012c). It is not known whether the type and gradation of the sand at the site is suitable for use in hydraulic fracturing. However, suitable sand deposits appear to be common in Chippewa County and therefore cannot be considered rare or unique.

There is no indication that any contaminated soils are present that could be exposed by development at the site. A USGS map of contaminated sites in Chippewa County shows a few closed leaking underground storage tank (LUST) and Environmental Repair Program (ERP) locations in the site area, but investigation and cleanup activities at these locations have been completed and approved by the state (USGS, 2012d). There is no reason to believe that any LUST or ERP concerns extend to the site.

Considering the information presented above, geology, soils, and seismology impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL. There would be no need for impact mitigation measures.

19.5.2.1.2.1.5 Water Resources Impacts

No streams or other surface water bodies have been identified within the boundaries of the Chippewa Falls site. Therefore, construction of the SHINE facility would have no direct impacts on surface water. The only surface water features identified in close proximity to the site are drainage ditches along the roads that border the site. These drainage ditches would receive rainfall runoff from the construction site, and they potentially could experience indirect impacts, such as increased runoff volumes or degradation of water quality due to sedimentation. However, potential impacts would be minimized by implementing best management practices, such as soil erosion and sediment control measures; runoff detention ponds; provisions to allow infiltration of rainfall; stormwater pollution prevention plans; and Spill Prevention, Control, and Countermeasure (SPCC) plans. Therefore, surface water impacts associated with facility construction would be SMALL.

The City of Chippewa Falls municipal water supply system would provide all water required for operation of the SHINE facility. A 16-inch water main currently serves the Wissota Lake Business Park, and this main would be expected to have more than enough capacity to satisfy the needs

of the SHINE facility. The facility would have no need to withdraw surface water or ground water. Best management practices would continue to be used during facility operation to minimize potential impacts on the drainage ditches that receive rainfall runoff from the site. Wastewater other than uncontaminated runoff would be discharged to the City of Chippewa Falls sanitary sewer system after being treated as described in Subsection 19.4.4. Wastewater discharges would comply with state and local pretreatment requirements. Therefore, surface water impacts associated with facility operation would be SMALL.

A soil boring drilled at the Chippewa Falls site in 2011 found ground water at a depth of 50 ft. (15.2 m) below the grade elevation (American Engineering Testing, 2011). As described in Subsection 19.4.3, the maximum depth of excavation required for the SHINE facility is 39 ft. (11.9 m) below grade. Although there could be some seasonal variation in the depth to ground water, it is not likely that significant dewatering of excavations would be required. Because the SHINE facility would not withdraw ground water during construction or operation, the only potential impact on ground water would be possible contamination due to a leak or spill of oil or chemicals. The soils found at the Chippewa Falls site have relatively high hydraulic conductivity, which increases the potential for ground water contamination (UW, 1989). However, oil and chemical storage and handling during both construction and operation would be governed by SPCC plans and standard best practices to prevent and contain leaks and spills. Therefore, ground water impacts associated with facility construction and operation would be SMALL.

As described above, best management practices and other standard provisions would be used during construction and operation to avoid and minimize impacts on surface water and ground water. These measures would ensure that impacts on water resources would be SMALL, and there would be no need for any other water resources impact mitigation measures.

19.5.2.1.2.1.6 Ecological Resources Impacts

No significant ecological resources were identified on or in the immediate vicinity of the Chippewa Falls site. The majority of land on the site is cultivated cropland used for growing corn and soybeans. An abandoned railroad right-of-way (with the tracks removed) cuts diagonally through the southern portion of the site. South of this right-of-way is a fallow agricultural field, some of which has been graded for use by the Wissota Lake Business Park. Observations during a field reconnaissance visit to the site indicate that the edges of the agricultural fields support weedy herbaceous plant species typical of early successional stages. The plant community associated with the abandoned railroad right-of way is a mid-successional disturbance community with a few deciduous tree species and few prairie remnant species observed during field reconnaissance. The fallow agricultural field south of the right-of-way appears to support a typical old field plant community. Representative plant species observed within these areas are listed in Table 19.5.2-3.

An apparent wetland community was observed in a narrow drainage way along the eastern edge of the site, immediately west of State Highway 178. Representative plant species observed within this area are listed in Table 19.5.2-3.

Wildlife observed at the site included red-tailed hawk, common crow, black-capped chickadee, and various sparrows. None of the plant or animal species observed during field reconnaissance are listed by the USFWS or the WDNR as Endangered, Threatened, or of Special Concern.

Figure 19.5.2-4 shows a conceptual facility layout, including the area that would be developed with permanent facility structures and the area that would be temporarily disturbed for construction laydown and parking. It can be seen that the permanently developed area occupies part of the abandoned railroad right-of-way, part of the cropland to the north, and part of the fallow field to the south, while the temporarily disturbed area is located entirely in the cropland.

The acreage of natural habitats found within the areas affected by the conceptual facility layout was estimated based on USGS land use/land cover GIS mapping data. Table 19.5.2-2 summarizes the acreages in the natural habitat categories and compares those quantities with the total acreages found within a 5 mi. (8.0 km) radius of the site. It can be seen that the permanently developed area would occupy approximately 0.5 ac. (0.2 ha) of deciduous forest, which represents the trees scattered along the abandoned railroad right-of-way. This is a tiny percentage of the deciduous forest found within 5 mi. (8.0 km) of the site, and the loss of this habitat would not be expected to have any noticeable ecological impact. Table 19.5.2-2 does not show any other natural habitats within the site boundaries.

The apparent wetland community observed along the eastern edge of the site is not identified as wetland habitat in the GIS data used to compile Table 19.5.2-2, probably because the community developed somewhat recently as a result of drainage alterations caused by State Highway 178. This wetland community may have some ecological value, but it would not be disturbed during construction or operation of the SHINE facility. The drainage ditch that supports the wetland community would receive rainfall runoff from the site and could potentially experience indirect impacts such as increased runoff volumes or degradation of water quality. However, as discussed in Subsection 19.5.2.1.2.1.5, potential impacts would be minimized by implementing best management practices and pollution prevention plans during construction and operation. Therefore, the wetland community would not be significantly affected.

The nearest wetland habitat represented in GIS mapping data is a small area located along a railroad line west of the Chippewa Falls site. This wetland area is approximately 0.25 mi. (0.4 km) from the site boundary at its nearest point, and it is separated from the site by two roads and a row of commercial buildings. It would not be directly or indirectly affected by construction or operation of the SHINE facility.

As discussed in Subsection 19.5.2.1.2.1.5, no streams or other surface water bodies have been identified within the boundaries of the Chippewa Falls site, and the only surface water features identified in close proximity to the site are drainage ditches along the roads that border the site. These drainage ditches do not represent significant aquatic ecological habitats. The nearest significant surface water bodies are Lake Wissota, which at its nearest point is approximately 0.75 mi. (1.2 km) north-northwest of the site, and the Chippewa River, which at its nearest point is approximately 0.9 mi. (1.4 km) south of the site. Both of these are significant ecological habitats, but neither would be directly or indirectly affected by construction or operation of the SHINE facility.

A consultation letter received from the USFWS (2012a) states that "no federally-listed, proposed, or candidate species, or designated critical habitat occurs within the project area." This letter does not express any concerns about or recommendations applicable to the development of the Chippewa Falls site.

A letter documenting an Endangered Resources Review conducted by the WDNR (2011a) lists four Endangered, Threatened, or Special Concern species known or likely to occur in the project area. These species and their regulatory status are shown in Table 19.5.2-4. The letter indicates that none of these species are likely to occur on the project site, because they all are associated with aquatic habitats, primarily Lake Wissota and the Chippewa River. The letter does not list any actions that need to be taken to comply with state or federal endangered species laws. It recommends avoiding impacts on the wetland community observed along the eastern edge of the site and implementing strict erosion and siltation controls during the entire construction period.

Considering the information presented above, aquatic and terrestrial ecology impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL. The methods used to clear vegetation, control erosion and siltation, and restore temporarily disturbed areas would be selected so as to minimize impacts as described for the Janesville site in Subsection 19.4.5. No other impact mitigation measures would be required.

19.5.2.1.2.1.7 Historic and Cultural Resources Impacts

No properties listed on the National Register of Historic Places (NRHP) are located on or in the immediate vicinity of the Chippewa Falls site. The nearest listed property is the Notre Dame Church and Goldsmith Memorial Chapel, which is approximately 2 mi. (3.2 km) southwest of the southwestern corner of the site. This property is located in a densely populated part of the City of Chippewa Falls, and it is separated from the site by numerous buildings, roads, trees, and other obstructions. Therefore, this property would not be directly or indirectly affected by construction or operation of the SHINE facility at the Chippewa Falls site.

The Wisconsin State Archeologist conducted a search of the Wisconsin Historic Preservation Database in order to identify any historic and archeological resources that have been reported in the site vicinity, regardless of whether those resources are listed on the NRHP or not. The database search did not identify any historic or archeological resources that have been reported on the site or within 1 mi. (1.6 km) of the site boundaries. The Wisconsin State Archeologist did not express any concerns about potential construction at the site except that Wisconsin law must be followed if human remains are unearthed or if Native American burial mounds or any marked or unmarked burial is suspected to be present. (Broihahn, 2011)

Field reconnaissance in the site vicinity did not identify any buildings or other features that appeared likely to have historic or cultural significance.

Based on the information presented above, construction and operation of the SHINE facility at the Chippewa Falls site would not be expected to directly or indirectly affect historic or cultural resources. If human remains or archeological artifacts were discovered during construction or operation, the procedures outlined for the Janesville site in Subsection 19.4.6 would be followed. Therefore, cultural resources impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL. There would be no need for impact mitigation measures.

19.5.2.1.2.1.8 Socioeconomic Impacts

This subsection evaluates the social and economic impacts that could result from constructing and operating the SHINE facility at the Chippewa Falls site. The evaluation includes the impacts of construction and operation activities themselves and the demands placed by the construction and operation workforces on the site and the surrounding region. As discussed in Subsection 19.4.7, the socioeconomic impacts of constructing and operating the SHINE facility at the Janesville site are expected to be largely restricted to Rock County, the county in which the site is located. Socioeconomic impacts in other counties are expected to be minimal and do not require evaluation. It is expected that the socioeconomic impacts of construction and operation at the Chippewa Falls site would similarly occur primarily in Chippewa County, the county in which the site is located. Therefore, the following impact evaluation focuses on Chippewa County. In accordance with the Revised ISG Augmenting NUREG-1537, the evaluation considers potential impacts on housing, public services, public education, tax revenues, and transportation.

Housing

Impacts on housing could be caused by construction and operation workers moving, either permanently or temporarily, into the region surrounding the project site (Chippewa County). This influx of workers could decrease the availability of unoccupied housing units and increase the cost to buy or rent housing. The severity of such impacts would depend primarily on the existing availability of unoccupied housing units compared with the number of workers who would move into the area.

NUREG-1437 establishes the following criteria for judging the severity of impacts on housing:

SMALL - Small and not easily discernible change in housing availability. Increases in rental rates or housing values equal or slightly exceed the statewide inflation rate.

MODERATE - Discernible but short-lived reduction in available housing units. Rental rates and housing values rise slightly faster than the inflation rate, but prices realign quickly once new housing units became available or project-related demand diminishes.

LARGE - Project-related demand for housing units results in very limited housing availability and increases in rental rates and housing values well above normal inflationary increases in the state.

Based on U.S. Census Bureau (USCB) data for 2010, the total number of housing units in Chippewa County was 27,185, and the number of vacant units was 2,775 (USCB, 2012a). As discussed in Subsection 19.4.7, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Chippewa County or the nearby region, but even if all of the workers moved into the county and required housing, the resulting demand for 420 housing units would represent only about 15 percent of the vacant housing units in the county. It is unlikely that this would result in any discernible change in housing availability or increase in housing costs. Therefore, the housing impact associated with construction of the SHINE facility at the Chippewa Falls site would be SMALL.

As discussed in Subsection 19.4.7, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the housing impact associated with operation of the SHINE facility at the Chippewa Falls site would be SMALL.

Public Services

Public services include water supply and waste water treatment facilities; police, fire, and medical services; and social services. Impacts on public services could be caused by construction and operation workers moving into the region surrounding the project site (Chippewa County). This influx of workers and their families could increase the demand for public services, potentially requiring local governments to add facilities, programs, and/or staff.

Per NUREG-1437, impacts on public services generally are considered to be SMALL if there is little or no need to add facilities, programs, and/or staff because of the influx of workers, and MODERATE or LARGE if additional facilities, programs, and/or staff are required.

USCB estimates that the population of Chippewa County in 2011 was 62,778, and the average number of people per household was 2.5 (USCB, 2012b). As discussed above, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Chippewa County or the nearby region, but even if all of the workers moved into the county with the average household size of 2.5 people, the resulting influx of 1,150 people would increase the population of the county by less than 2 percent. It is unlikely that this small population increase would result in a noticeable increase in the demand for public services or a need to add facilities, programs, and/or staff. Therefore, the public services impact associated with construction of the SHINE facility at the Chippewa Falls site would be SMALL.

As discussed above, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the public services impact associated with operation of the SHINE facility at the Chippewa Falls site would be SMALL.

Public Education

Impacts on public education could be caused by construction and operation workers moving into and bringing school-aged children into the region surrounding the project site (Chippewa County). This increase in the number of school-aged children could cause crowding of local schools and potentially require school systems to add facilities and/or staff.

Per NUREG-1437, impacts on education are considered to be SMALL if the project-related increase in school enrollment represents less than 3 percent of the total school enrollment in affected school systems, MODERATE if 4 to 8 percent, and LARGE if more than 8 percent.

Based on Wisconsin Department of Public Instruction (WDPI) data for 2010, the total public school enrollment in Chippewa County was 9,218 students (WDPI 2012). As discussed above, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Chippewa County, but if all of the workers moved into the county and brought a school-aged child who attended a public school, the resulting influx of 420 students would increase school

enrollment by approximately 4.6 percent. Using the NUREG-1437 guideline, this would indicate a MODERATE impact on education. However, given the conservativeness of the assumption that all construction workers would move into the county and the fact that the peak construction employment period would last less than 1 year, it is unlikely that the increase in school-aged children would result in noticeable crowding or a need to add facilities or staff. Therefore, the public education impact associated with construction of the SHINE facility at the Chippewa Falls site would be SMALL

As discussed above, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the public education impact associated with operation of the SHINE facility at the Chippewa Falls site would be SMALL.

Taxes

Property taxes and other taxes paid during construction and operation of the SHINE facility would benefit the state and local jurisdictions that collect the taxes. Per NUREG-1437, tax impacts are considered SMALL if project-related tax revenues represent less than 10 percent of the total tax revenues of the local taxing jurisdictions, MODERATE if 10 to 20 percent, and LARGE if more than 20 percent.

As discussed in Subsection 19.4.7, SHINE intends to enter into a Tax Increment Financing (TIF) agreement with the City of Janesville. This agreement is expected to cover the first 10 years of the NRC license period, which includes the construction period for the SHINE facility. Under this agreement, SHINE expects to pay a total of $635,000 per year in property taxes and payments in lieu of taxes. If the SHINE facility were constructed at the Chippewa Falls site, it is expected that SHINE would enter into a similar TIF agreement and make similar payments during the construction period. Based on Wisconsin Department of Revenue (WDOR) data for Chippewa County, the property taxes collected in 2011 were $14,887,300 (WDOR, 2012a). Therefore, even if the entire payments of $635,000 per year were counted toward property taxes, the payments would represent approximately 4.3 percent of the annual property tax revenues of Chippewa County, and the tax impact associated with construction of the SHINE facility at the Chippewa Falls site would be SMALL.

After expiration of the 10-year TIF agreement with the City of Janesville, SHINE expects to pay property taxes of approximately $660,000 per year during the remaining period of operation for the SHINE facility. It is expected that tax payments at the Chippewa Falls site would be approximately the same, and such payments would represent approximately 4.4 percent of the annual property tax revenues of Chippewa County. Therefore, the tax impact associated with operation of the SHINE facility at the Chippewa Falls site would be SMALL.

Transportation

Transportation in the vicinity of the SHINE facility could be affected by the increase in vehicle traffic associated with construction and operation workers commuting to and from the site and the delivery of materials and equipment to the site. The increase in vehicle traffic could cause congestion and delays on local roads. The severity of such impacts would depend primarily on the existing road conditions and traffic volumes on the local roads compared with the expected volume of project-related traffic.

As shown in Figure 19.5.2-4, the entrance road for the SHINE facility would connect with Commerce Parkway, a City of Chippewa Falls street that forms the western boundary of the site. No other construction, modification of roads, or other transportation infrastructure would be required for construction, operation, or decommissioning of the SHINE facility. However, Commerce Parkway is a two-lane road that probably would experience a significant increase in traffic volume due to project-related traffic. Therefore, construction of turning lanes or other improvements might be necessary to avoid traffic delays on Commerce Parkway, as discussed below.

U.S. Highway 53 provides long-distance road access to the site area. The exit nearest to the site is Exit 99, which is approximately 5 mi. (8.0 km) west of the site and connects with County Highway S. Thus, it is expected that most vehicles traveling to the site from outside of the Chippewa Falls metropolitan area would travel on County Highway S and then turn onto Commerce Parkway. Many vehicles traveling to the site from inside of the metropolitan area probably also would travel on County Highway S, although some might travel on County Highway I. Commerce Parkway and County Highway S are two-lane roads with paved shoulders, while County Highway I is a four-lane road with curbed shoulders and a two-way turning lane as the median.

Table 19.5.2-5 provides Wisconsin Department of Transportation (WDOT) peak hourly traffic data for Commerce Parkway, County Highway S, County Highway I, and other roads in the site area (WDOT, 2011). It can be seen that the traffic volume on most of these roads is around 400 vehicles per hour during both the morning and evening peak periods.

As discussed in Subsection 19.4.7, the maximum number of vehicles expected to travel to and from the site during construction of the SHINE facility is 465 per day. The great majority of these vehicles (approximately 420) would represent commuting construction workers. These vehicles generally would arrive at the site on Commerce Parkway at about the same time each morning and leave on Commerce Parkway at about the same time each evening. Thus, commuting construction workers could roughly double the volume of traffic on Commerce Parkway during the peak morning and evening periods. The increase in traffic volumes on other roads in the site vicinity probably would not be as great but could be significant.

Considering the nature of the roads in the site vicinity and the increase in traffic volume these roads would experience, it is likely that the peak construction-related traffic would noticeably alter existing transportation conditions (cause noticeable traffic delays) but not be sufficient to destabilize transportation resources. Therefore, the transportation impact associated with project construction would be MODERATE.

As discussed in Subsection 19.4.7, the maximum number of vehicles expected to travel to and from the site during operation of the SHINE facility is 118 per day. The great majority of these vehicles would represent commuting operation workers, but it is expected that these workers would be divided into three shifts. Thus, the maximum number of vehicles arriving at or departing from the site at any one time would be much less than during the construction period. Therefore, the transportation impact associated with facility operation would be SMALL.

In order to alleviate traffic congestion during project construction, mitigation measures, such as adding turning lanes might be necessary, especially on Commerce Parkway. Specific mitigation measures would be selected after a detailed evaluation of traffic patterns and potential problem areas.

19.5.2.1.2.1.9 Human Health Impacts

19.5.2.1.2.1.9.1 Nonradiological Impacts

No unusual existing sources of nonradioactive chemical exposure or effluents have been identified in the vicinity of the Chippewa Falls site. No operating industrial facilities with environmental monitoring programs have been identified in the site vicinity.

A SHINE facility at the Chippewa Falls site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.8.1 with regard to the following factors:

- Nonradioactive chemical sources (location, type, strength).
- Nonradioactive liquid, gaseous, and solid waste management and effluent control systems.
- Nonradioactive effluents released into the on-site and off-site environment.
- Chemical exposure to the public and on-site workforce.
- Physical occupational hazards.
- Mitigation measures for nonradiological human health impacts.

Nonradiological chemical sources, wastes, effluents, and occupational hazards associated with the SHINE facility would be strictly controlled to ensure compliance with applicable environmental and occupational regulations and standards as discussed in Subsection 19.4.8.1. Therefore, the nonradiological human health impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.9.2 Radiological Impacts

No unusual existing sources of radiation have been identified in the vicinity of the Chippewa Falls site. The major sources and levels of background radiation exposure at the Chippewa Falls site are very similar to the sources and levels described for the Janesville site in Subsection 19.3.8.2.

The physical layout of the Chippewa Falls site is shown in Figure 19.5.2-4. Radioactive materials would be located in the central part of the production facility building. A SHINE facility at the Chippewa Falls site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.8.2 with regard to the following factors:

- Characteristics of radiation sources and expected radioactive effluents.
- Compliance with 10 CFR 20.1301, including calculated radiation dose rates at the site boundary.
- Annual radiation dose to the maximally exposed worker.
- Mitigation measures to minimize public and occupational exposures to radioactive material.

Radiation sources and radioactive effluents would be strictly controlled to ensure compliance with applicable regulations and standards as discussed in Subsection 19.4.8.2. Therefore, the radiological human health impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.10 Waste Management Impacts

No conditions have been identified for the Chippewa Falls site that would significantly affect waste management impacts. A SHINE facility at the Chippewa Falls site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.9 with regard to the following factors:

- Sources, types, and approximate quantities of solid, hazardous, radioactive, and mixed wastes.
- Proposed waste management systems designed to collect, store, and process the waste.
- Anticipated waste disposal or waste management plans.
- Anticipated waste-minimization plans to minimize the generation of waste.

Wastes would be handled, processed, stored, and disposed as discussed in Subsection 19.4.9. Therefore, the waste management impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.11 Transportation Impacts

Per the Final ISG Augmenting NUREG-1537, the traffic impacts of vehicles associated with the SHINE facility are discussed in Subsection 19.5.2.1.2.1.8. This subsection discusses the radiological and other human health impacts of transporting nuclear and non-nuclear materials associated with the project.

No conditions have been identified for the Chippewa Falls site that would significantly affect the impacts of transporting nuclear and non-nuclear materials, including radioactive waste, nonradioactive waste, and medical isotopes. Because the Chippewa Falls site and the Janesville site are relatively close to each other in comparison with the projected origins and destinations of nuclear and non-nuclear materials, distance-related impacts of transportation would be essentially the same. A SHINE facility at the Chippewa Falls site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.10 with regard to the following factors:

- Transportation modes.
- Approximate transportation distances.
- Treatment and packaging for radioactive and nonradioactive wastes.
- Calculated radiological dose to members of the public and workers from incident-free transportation scenarios.

The impact of the transportation of nuclear and non-nuclear materials is discussed in Subsections 19.4.10.1.3 and 19.4.10.2. The transportation impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.12 Postulated Accident Impacts

No conditions have been identified for the Chippewa Falls site that would significantly affect the radiological and nonradiological impacts from postulated accidents. A SHINE facility at the Chippewa Falls site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.11 with regard to the following factors:

- Credible accidents having a potential for releases into the environment.
- Radiological and nonradiological consequences from the postulated accidents.

The SHINE facility would be designed, constructed, and operated to ensure that the consequences of postulated accidents would comply with applicable regulations and standards as discussed in Subsection 19.4.11. Therefore, the postulated accident impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.13 Environmental Justice Impacts

Environmental justice issues involve aspects of the project that could disproportionately impact minority or low-income populations. The potential for disproportionate impacts depends primarily on the location of the project facilities in relation to existing minority and low-income populations.

Minority and low-income populations within 5 mi. (8 km) of the Chippewa Falls site were identified based on USCB Census block group data (USCB, 2012c and 2012d). Census block groups with above-average minority and low-income populations were determined by comparing the minority and poverty populations in each block group to the total population in that block group and to the average minority and poverty populations in the county and state. Where the minority or poverty population in a block group exceeded 50 percent of the total population in that block group, or where the minority or poverty population was found to be at least 20 percentage points greater than the comparable county and/or state averages, the minority or poverty population was defined as "above average." This methodology is consistent with NRC guidance for identification of Environmental Justice populations (NRC, 2004).

Table 19.5.2-6 shows the block groups and census tracts within 5 mi. (8 km) of the Chippewa Falls site, the percentage of households below the poverty level in each, and the percentage of each minority group, including American Indian and Hispanic populations, in each. The percentage of households below the poverty level, the percentage of each minority group, and aggregate percentage of all minority groups are compared with the average percentage in Chippewa County and the state of Wisconsin.

As shown in Table 19.5.2-6, none of the block groups/census tracts within 5 mi. (8 km) of the Chippewa Falls site has an above average percentage of any minority groups individually or in the aggregate, and only one block group/census tract has an above average percentage of households below the poverty level. This block group/census tract has 36.5 percent of households below the poverty level, compared with 10.9 percent in Chippewa County and 11.2 percent in the state of Wisconsin. The location of this block group/census tract is shown in Figure 19.5.2-6. It is approximately 2 mi. (3.2 km) southwest of the Chippewa Falls site. It is located in a densely populated part of the City of Chippewa Falls, and it is separated from the site by numerous buildings, roads, trees, and other obstructions. None of the primary transportation routes that would be used to transport workers, materials, or equipment to the Chippewa Falls

site pass through this block group/census tract. Therefore, this population would not be directly or indirectly affected by construction or operation of the SHINE facility at the Chippewa Falls site.

No American Indian reservations or other special communities have been identified within 5 mi. (8 km) of the Chippewa Falls site. The nearest American Indian reservation is the Winnebago Reservation, which belongs to the Ho-Chunk Nation and is located approximately 35 mi. (56 km) southeast of the site (National Atlas of the United States, 2012; WDNR, 2012b).

Based on the information presented above, there is no indication that any minority or low-income population would be disproportionately affected during project construction or operation as compared to the effect on the general population. Based on the potential for disproportionate exposure to environmental hazards from the SHINE facility as well as multiple-hazard and cumulative hazard conditions, the human health and environmental effects on minority and low-income populations would not be significantly high or adverse. Therefore, the environmental justice impacts associated with construction and operation of the SHINE facility at the Chippewa Falls site would be SMALL.

19.5.2.1.2.1.14 Cumulative Impacts

Past, present, and reasonably foreseeable future development projects and other actions that could result in cumulative impacts at the Chippewa Falls site were identified by searching for economic development plans, permit lists, news releases, and similar sources of information. An effort was made to identify all relevant activities conducted, regulated, or approved by a federal agency or non-federal entity within 5 mi. (8 km) of the site. Available information about the projects and other activities identified is provided in Table 19.5.2-7.

As shown in Table 19.5.2-7, the projects and other activities located within 5 mi. (8 km) of the Chippewa Falls site generally are of a relatively small scale and would not be expected to have significant impacts in the same areas affected by the SHINE facility. The Wissota Green Housing Development, a planned neighborhood that was to be developed approximately 1 mi. (1.6 km) from the Chippewa Falls site might have contributed significantly to the land use impacts of the SHINE facility; however, current information indicates that this project is not likely to proceed in the form originally proposed. It is possible that the individual lots may be developed by private owners, but this type of development would likely occur gradually over a number of years, which would mitigate the cumulative impacts somewhat.

The projects in Table 19.5.2-7 that are procedeeding or appear likely to proceed would not be expected to have significant land use impacts. However, some of these projects could produce increases in vehicle traffic and ambient noise that might affect some of the same areas as the SHINE facility. Therefore, the cumulative effects of these projects might contribute to the traffic and noise impacts of the SHINE facility, which are expected to be MODERATE as discussed above.

19.5.2.1.2.2 Stevens Point Site

19.5.2.1.2.2.1 Description

The Stevens Point Site is located adjacent to the eastern edge of the corporate boundaries of the City of Stevens Point, in Portage County, Wisconsin. No public roads currently border the site. The site boundaries were determined by the City of Stevens Point when they recommended the

site to SHINE. The city has indicated that if the SHINE project proceeded at this site they would annex the site property and install public streets along the northern and western site boundaries. The SHINE project would be dependent on the installation of these public streets, and the street impacts are considered part of the direct project impacts discussed below.

The terrain across the site is flat, with little noticeable relief other than a gentle slope to the south. No residences or other structures are located within the site boundaries. Most of the site is occupied by a woodlot, but there are areas of cultivated cropland along the western and southern sides of the site.

Figure 19.5.2-7 shows a conceptual layout of the SHINE facility on the Stevens Point site, including the area that would be developed with permanent facility structures, the area that would be temporarily disturbed for construction laydown and parking, and the remaining area within the site boundaries. The area developed with permanent structures occupies most of the woodlot, while the area temporarily disturbed for construction laydown and parking is located in the cropland along the western edge of the site. The production facility building, which is the only part of the facility that contains safety-related equipment, is located near the center of the site, positioned so as to maximize the distance to the site boundaries in all directions.

The area within 1 mi. (1.6 km) of the site is a mixture of agricultural land and suburban-type residential and commercial development. The nearest occupied residences are two houses located along Old Highway 18 approximately 0.2 mi. (0.32 km) north of the northern site boundary. The nearest residential concentration is a subdivision located along Old Highway 18 approximately 0.6 mi. (0.96 km) northwest of the site boundary. A Lands' End outlet facility is located immediately west of the site, and the grounds of this facility include an exercise track that passes less than 0.1 mi. (0.16 km) from the site boundary.

In addition to residences, several other sensitive features are located within 1 mi. (1.6 km) of the site boundaries. These include a preschool, two child day care facilities, a medical clinic, and a city park. Table 19.5.2-8 lists the distance to each of these sensitive features from the nearest site boundary and the center point of the safety-related area in the production facility building. Table 19.5.2-8 also lists the distance to the nearest hospital, public school, and listed historical property, all of which are more than 1 mi. (1.6 km) from the site boundaries. Figure 19.5.2-8 shows the location of the sensitive features identified within 1 mi. (1.6 km). It should be noted that GIS data identifies a public school known as Stockton School located along Old Highway within 1 mi. (1.6 km) of the site boundaries, but during field reconnaissance in November 2011, it appeared that this school was no longer in use. Therefore, Stockton School is not listed as a public school but is listed as a potential historical property in Table 19.5.2-8.

Interstate 39, which is located about 1 mi. (1.6 km) west of the site at its nearest point, provides long-distance access to the site area. The exit nearest to the site is Exit 156 (County Highway HH), which is approximately 1.5 mi. (2.4 km) southwest of the site. Exit 158 (U.S. Highway 10) is approximately 2 mi. (3.2 km) northwest of the site. U.S. Highway 10 is a well-maintained multi-lane divided highway. The other roads in the immediate vicinity of the site (County Highway HH, Old Highway 18, County Highway R, and Burbank Road) are two- or four-lane roads of variable width and condition.

Stevens Point Municipal Airport is located approximately 2.8 mi. (4.5 km) northwest of the site. Aircraft using this airport would be the primary means of transporting isotopes produced by the SHINE facility.

An overhead electrical line, municipal water supply pipeline, sanitary sewer pipeline, and natural gas pipeline are located north of the Lands' End facility along County Highway R, approximately 0.3 mi. (0.48 km) from the site. It is assumed these utilities would be extended to the site when the city constructed the public streets that would border the site.

19.5.2.1.2.2.2 Land Use and Visual Resources Impacts

Existing land use on the Stevens Point site is predominantly forestry and agriculture. Most of the site is occupied by a second-growth woodlot, and some evidence of logging was observed during field reconnaissance in November 2011. There are areas of cultivated cropland along the western and southern sides of the site, and these areas appeared to have been planted in corn. The field at the southern side of the site was pivot-irrigated. Virtually, the entire site is composed of soils classified as Prime Farmland or Farmland of Statewide Importance. No recreational use of the site or the immediate vicinity was identified except for the exercise track on the grounds of the Lands' End outlet facility, which is immediately west of the site.

No residences or other structures are located within the site boundaries. The site currently is zoned by Portage County partly for Agricultural use and partly for Industrial use (Portage County, 2012a), but the City of Stevens Point has indicated that if the SHINE project proceeded they would annex the site property and zone it for Industrial use. The City's Comprehensive Plan (City of Stevens Point, 2011a) shows the site property as part of a planned business park. However, Portage County's Comprehensive Plan (Portage County, 2012b) indicates that the area is planned partly for Rural Residential use (2 ac. or more per residence) and partly for Limited Agriculture/Mixed use (low intensity agricultural uses that maintain the rural characteristics of the area).

The acreage of each major land use category currently found within the areas affected by the conceptual facility layout was estimated based on USGS land use/land cover GIS mapping data (USGS, 2006). Table 19.5.2-9 summarizes the acreages in the major land use categories and compares those quantities with the total acreages found within a 5 mi. (8.0 km) radius of the site. It can be seen that the acreage of each land use category potentially affected by the facility layout is less than 1 percent of the total acreage of that category found within 5 mi. (8.0 km).

There is no reason to believe that construction of the SHINE facility would destabilize any important land use resources. However, construction would change much of the site from predominantly forestry and agricultural use to industrial use, which would noticeably alter the existing land use resources of the site. This alteration may be consistent with the City of Stevens Point's plan to develop the area as a business park, but it is not consistent with the existing zoning on parts of the site or with Portage County's planning of the area for rural residential and low intensity agricultural use. In addition, the project would depend on the City constructing a public street along at least one of the site boundaries, and this would have further land use impacts, converting a somewhat isolated rural area into a more urbanized area. Therefore, the land use impact associated with project construction would be MODERATE.

During operation of the SHINE facility, land use impacts would be reduced. No new land use impacts would occur beyond those described above for project construction, and some areas that were temporarily disturbed for construction laydown and parking might be returned to agricultural use. Therefore, the land use impact associated with facility operation would be SMALL.

Visual resources in the vicinity of the site could be affected by the visual intrusion of industrial structures and equipment. During project construction, dust could create additional visual intrusions. Given that the site area currently includes some rural and residential scenery, in addition to institutional and commercial scenery, project construction and operation would alter the existing visual conditions somewhat. However, the severity of visual impacts on the human population would depend primarily on the visibility of the project facilities from sensitive viewing areas.

Field reconnaissance and examination of aerial photographs indicate that more than 100 residences are located within 1 mi. (1.6 km) of the site boundaries. As discussed in Subsection 19.5.2.1.2.2.1, the area within 1 mi. (1.6 km) also includes several other sensitive viewing areas, including a preschool, two child day care facilities, a medical clinic, and a city park. Although trees and existing buildings would block the view from some of these locations, some would be expected to have at least a partial view of the SHINE facility during construction and operation. In addition, the exercise track on the grounds of the Lands' End outlet facility would have at least a partial view of the SHINE facility during construction and operation.

NUREG-1437 establishes the following criteria for judging the severity of aesthetic impacts:

SMALL - No complaints from affected public about a changed sense of place or a diminution in enjoyment of the physical environment, and no measurable impact on socioeconomic institutions and processes.

MODERATE - Some complaints from affected public about a changed sense of place or a diminution in enjoyment of the physical environment, and measurable impacts that do not alter the continued functioning of socioeconomic institutions and processes.

LARGE - Continuing and widely shared opposition to the project based on a perceived degradation of the area's sense of place or diminution in enjoyment of the physical environment, and measurable social impacts that perturb the continued functioning of community institutions and processes.

Considering that the construction of the SHINE facility would noticeably alter the appearance of the project site and be at least partially visible from numerous sensitive viewing areas, it is possible that project construction would generate some public complaints related to a changed sense of place and diminished enjoyment of the physical environment. However, it is not likely that there would be "continuing and widely shared opposition" to the project or that there would be "measurable social impacts that perturb the continued functioning of community institutions and processes." Therefore, the visual resources impact associated with project construction would be MODERATE.

Operation of the SHINE facility would not result in significant further alteration of aesthetic conditions, and it does not seem likely that there would be continued public complaints related to diminished enjoyment of the physical environment. Therefore, the visual resources impact associated with project operation would be SMALL.

As shown in Figure 19.5.2-7, the conceptual layout of the Stevens Point site includes provisions to plant trees along the facility access road and the boundaries of the site that border public roads. These provisions would partially mitigate the visual impact of the project, especially during

project operation, and this mitigation is considered in the impact assessment discussed above. No other feasible mitigation measures for land use or visual impacts have been identified.

19.5.2.1.2.2.3 Air Quality and Noise Impacts

The Stevens Point site is located in Portage County, Wisconsin, which is part of the North Central Wisconsin Intra-State Air Quality Control Region (WDNR, 2012a). The ambient air quality in Portage County currently is in attainment with the NAAQS for all criteria pollutants (ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead) (USEPA, 2012a). The nearest county out of attainment with the NAAQS is Sheboygan County, Wisconsin, which is non-attainment for ozone (USEPA, 2012a). Sheboygan County is located along the western shore of Lake Michigan, approximately 100 mi. (161 km) east-southeast of the Stevens Point site. At this distance and beyond, air pollution emissions from the Stevens Point site would not be expected to have any noticeable effect on non-attainment areas.

The air quality impacts of constructing and operating the SHINE facility at the Stevens Point site would be very similar to the impacts discussed for the Janesville site in Subsection 19.4.2. Potential air pollution emissions during construction would include dust from earthmoving and material handling activities, and exhaust emissions from construction equipment and vehicles. In general, these emissions would be the same as the emissions associated with any large construction project. Emission-specific control measures, such as watering areas of disturbed soil, would be implemented to limit air quality impacts and ensure compliance with applicable federal and state regulations. Therefore, air quality impacts associated with facility construction would be SMALL.

During facility operation, the isotope production process would emit very small quantities of nitrogen oxides. Natural gas firing to heat buildings and occasional testing of the emergency diesel generator would emit nitrogen oxides and very small quantities of particulate matter and sulfur dioxide. Standard emission control measures, such as proper mixing of fuels and combustion air, would be implemented to limit air quality impacts. Emissions during facility operation would be governed by applicable state permits, which would ensure compliance with the NAAQS and other applicable regulatory requirements. Therefore, air quality impacts associated with facility operation would be SMALL.

As discussed above, standard emission control measures would be implemented to limit air quality impacts during construction and operation. These measures would ensure that impacts on air quality would be SMALL, and there would be no need for any other air quality impact mitigation measures.

Noise emissions during construction at the Stevens Point site would be very similar to the impacts discussed for the Janesville site in Subsection 19.4.2. Based on the depth to bedrock at the Stevens Point site (see Subsection 19.5.2.1.2.2.4), blasting and pile driving would not be required for excavation or installation of foundations. The primary source of noise during construction would be the operation of heavy equipment. This noise would be noticeable in the immediate construction area, but it generally would be expected to attenuate to acceptable levels before reaching sensitive receptors. However, vehicular traffic due to construction workers commuting to and from the site and deliveries of equipment and supplies to the site would increase noise levels in the immediate vicinity of several sensitive receptors. It is expected that much of the project-related traffic would move on County Highway R (Eisenhower Road) and/or County Highway HH (McDill Avenue), and these roads have numerous residences, a medical

clinic, two day care facilities, and a preschool in close proximity. It is likely that increased traffic noise would be noticeable at some of these receptors. In addition, construction noise would be noticeable at the exercise track on the grounds of the Lands' End outlet facility. Therefore, noise impacts associated with project construction would be MODERATE.

During operation, project-related traffic would be greatly reduced, and there would be no use of heavy construction equipment on the site. As discussed in Subsection 19.4.2, no significant sources of noise have been identified for project operation. Therefore, noise impacts associated with operation would be SMALL.

As shown in Figure 19.5.2-7, the conceptual layout of the Stevens Point site includes provisions to plant trees along the facility access road and the boundaries of the site that border public roads. The layout also would accommodate a low earthen berm around the permanent project facilities. These provisions would be expected to achieve some attenuation of operational noise, and this mitigation is considered in the impact assessment discussed above. No other feasible mitigation measures for noise impacts have been identified.

19.5.2.1.2.2.4 Geology, Soils, and Seismology Impacts

The majority of the surface soils at the Stevens Point site consist of Richford loamy sand derived from glacial outwash materials. The Richford loamy sand consists of about 65 to 95 percent sand, generally less than 10 percent silt, and 1 to 10 percent clay. The hydraulic conductivity of the loamy sand is high (approximately 0.015 cm/s), and therefore it is well-drained and not susceptible to ponding or flooding. Erosion potential of the surficial soils is expected to be slight. (UW, 1964; NRCS, 2012)

Subsoil information obtained from a set of borings drilled at the site and records of four water wells and one test hole drilled within 1 to 2 mi. (1.6 to 3.2 km) of the site (WGNHS, 2005) corroborate the soils information provided above.

Bedrock directly lies beneath the glacial outwash materials and primarily consists of granite (Greenberg and Brown, 1986). Karst conditions are not anticipated in the bedrock (Mudrey, et al., 1982; WGNHS, 2012). The drilling log of one water well in the site vicinity indicates granite bedrock at a depth of 77 ft. (23.5 m), while the other wells in the vicinity were drilled to depths of 54 ft. to 72 ft. (16.5 to 21.9 m) and did not encounter bedrock. A borehole at the site was advanced to a depth of 140 ft. (42.7 m) and did not encounter bedrock. Based on this information, bedrock at the site is expected to be more than 50 ft. (15.2 m) below the grade elevation. As described in Subsection 19.4.3, the maximum depth of excavation required for the SHINE facility is 39 ft. (11.9 m) below grade. Therefore, blasting would not be required for installation of foundations or other construction activities.

The USGS National Seismic Hazard Maps database (USGS, 2012a) indicates the following peak ground accelerations for the Stevens Point site area:

- 10-percent probability of exceedance in a 50-year period: 0.90 percent of gravity.
- 2-percent probability of exceedance in a 50-year period: 2.46 percent of gravity.

Based on these values, seismicity in the site area is considered to be minimal. In addition, no significant historical earthquakes have been recorded in the site area or anywhere in Wisconsin

(USGS, 2012b), and no Quaternary faults (age less than 1.6 x 106 years) are known to be present in the site area or anywhere in Wisconsin (USGS, 2012c).

The Stevens Point site is flat and does not contain landslide hazards. Because the site soils are primarily granular (sand with small percentages of silt and clay), and no underground mining activity has been identified in the site area, land subsidence is not anticipated due to either consolidation of the site soils or local loss of support resulting from underground mining. In addition, no potential for shrink/swell action in response to changes in the moisture content of the soil as related to the stability of shallow foundations is anticipated. Potential for frost heave beneath shallow foundations should also be minimal.

Available on-site boring logs indicate a generally loose condition in the site soils. Therefore, it is expected that the load bearing capacity of the site soils is rather low and the soils would be susceptible to settlement under heavy loads. For the SHINE facility main building and any other structures that generate large foundation loads, the site soils would likely need to be improved with dynamic compaction, vibro-compaction, cement mixing, and/or grouting. However, it should be possible to design the foundations without the need for piles or drilled piers. Due to the low seismicity of the site area, the potential for earthquake induced liquefaction of subsoil below the groundwater table does not need to be considered.

Based on the information summarized above, the geology, soils, and seismology of the Stevens Point site would not be expected to have any significant impacts on the SHINE facility. Similarly, construction and operation of the SHINE facility would not be expected to have any significant impacts on the geology, soils, and seismology of the site.

There is no indication that any rare or unique rock, mineral, or energy assets are present that could be impacted by development at the site. Mining of sand is conducted in certain parts of Wisconsin for use in hydraulic fracturing associated with natural gas production. It is not known whether the type and gradation of the sand at the Stevens Point site is suitable for use in hydraulic fracturing. However, suitable sand deposits appear to be common in some parts of Wisconsin and therefore cannot be considered rare or unique.

There is no indication that any contaminated soils are present that could be exposed by development at the site. A USGS map of contaminated sites in Portage County (where the Stevens Point site is located) shows a few closed LUST and ERP locations in the site area, but investigation and cleanup activities at these locations have been completed and approved by the state (USGS, 2012e). There is no reason to believe that any LUST or ERP concerns extend to the site.

Considering the information presented above, geology, soils, and seismology impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL. There would be no need for impact mitigation measures.

19.5.2.1.2.2.5 Water Resources Impacts

No streams or other surface water bodies have been identified within the boundaries of the Stevens Point site. Therefore, construction of the SHINE facility would have no direct impacts on surface water. The only surface water features identified in close proximity to the site are local drainage ditches. These drainage ditches would receive rainfall runoff from the construction site, and they potentially could experience indirect impacts such as increased runoff volumes or

degradation of water quality due to sedimentation. However, potential impacts would be minimized by implementing best management practices such as soil erosion and sediment control measures; runoff detention ponds; provisions to allow infiltration of rainfall; stormwater pollution prevention plans; and SPCC plans. Therefore, surface water impacts associated with facility construction would be SMALL.

The City of Stevens Point municipal water supply system would provide all water required for operation of the SHINE facility. A 12 inch water main currently is located along County Highway R, to the northwest of the site, and it is assumed that the city would extend this main to the site when they constructed the public streets that would border the site. This main would be expected to have more than enough capacity to satisfy the needs of the SHINE facility. The facility would have no need to withdraw surface water. Best management practices would continue to be used during facility operation to minimize potential impacts on the drainage ditches that receive rainfall runoff from the site. Wastewater other than uncontaminated runoff would be discharged to the City of Stevens Point sanitary sewer system after being treated as described in Subsection 19.4.4. Wastewater discharges would comply with state and local pretreatment requirements. Therefore, surface water impacts associated with facility operation would be SMALL.

Several soil borings drilled at the Stevens Point site in 2011 encountered ground water at a depth of 8 ft. to 11 ft. (2.4 to 3.4 m) below the grade elevation. The depth to ground water observed inside of water wells recorded in the site vicinity varied between 7 ft. and 20 ft. (2.1 and 6.1 m) below the grade elevation (WGNHS, 2005). As described in Subsection 19.4.3, the maximum depth of excavation required for the SHINE facility is 39 ft. (11.9 m) below grade. Therefore, it is likely that extensive dewatering of excavations would be required during construction. This dewatering probably would be required for a period of several months and could have a noticeable impact on ground water levels in the immediate site vicinity. Therefore, ground water impacts associated with facility construction would be MODERATE.

High ground water levels could continue to be a concern after the completion of construction, but it is anticipated that the facility foundations could be designed so as to avoid the need for continued dewatering. Because the facility would not need to withdraw ground water during operation, the only potential impact on ground water would be possible contamination due to a leak or spill of oil or chemicals. The soils found at the Stevens Point site have relatively high hydraulic conductivity, which increases the potential for ground water contamination (UW, 1989). However, oil and chemical storage and handling would be governed by SPCC plans and standard good practices to prevent and contain leaks and spills. Therefore, ground water impacts associated with facility operation would be SMALL.

As described above, best management practices and other standard provisions would be used during construction and operation to avoid and minimize impacts on surface water and ground water. The need for continued dewatering during facility operation would be avoided by proper design of foundations. There would be no need for any other water resources impact mitigation measures.

19.5.2.1.2.2.6 Ecological Resources Impacts

No significant ecological resources were identified on or in the immediate vicinity of the Stevens Point site. Approximately two-thirds of the site is occupied by a second-growth woodlot dominated by oak and maple species with a few pines and other evergreens. Some evidence of logging was observed along the southern edge of the woodlot during a field reconnaissance visit

to the site. Representative plant species observed within the woodlot are listed in Table 19.5.2-10.

The western and southern portions of the site are cultivated cropland, primarily used for growing corn. The edges of these agricultural fields support weedy herbaceous plant species typical of early successional stages. Representative plant species observed within the fields and field edges are listed in Table 19.5.2-10.

Wildlife observed at the site included red-tailed hawk, blue jay, common crow, red-bellied woodpecker, white-breasted nuthatch, black-capped chickadee, and various sparrows. None of the plant or animal species observed during field reconnaissance are listed by the USFWS or WDNR as Endangered, Threatened, or of Special Concern.

Figure 19.5.2-7 shows a conceptual facility layout, including the area that would be developed with permanent facility structures and the area that would be temporarily disturbed for construction laydown and parking. It can be seen that the permanently developed area occupies less than half of the woodlot, while the temporarily disturbed area is located entirely in the western cropland area.

The acreage of natural habitats found within the areas affected by the conceptual facility layout was estimated based on USGS land use/land cover GIS mapping data. Table 19.5.2-9 summarizes the acreages in the natural habitat categories and compares those quantities with the total acreages found within a 5 mi. (8.0 km) radius of the site. It can be seen that the entire site comprises approximately 48.2 ac. (19.5 ha) of deciduous forest, which is less than 1 percent of the deciduous forest found within 5 mi. (8.0 km) of the site. Even if all of the forest on the site was cleared (which could be required for site security purposes), the loss of this habitat would not be expected to have any noticeable ecological impact. The only other natural habitat shown in Table 19.5.2-9 is 1.6 ac. (0.6 ha) of mixed forest.

No wetland habitat was observed on or near the site during field reconnaissance, and none is represented in GIS mapping data within 1 mi. (1.6 km) of the site boundaries. The nearest wetland habitat in GIS mapping data is a small area located approximately 1.2 mi. (1.9 km) north of the site boundary at its nearest point. This area is separated from the site by U.S. Highway 10, Old Highway 18, a railroad line, and several buildings. It would not be directly or indirectly affected by construction or operation of the SHINE facility.

As discussed in Subsection 19.5.2.1.2.2.5, no streams or other surface water bodies have been identified within the boundaries of the Stevens Point site, and the only surface water features identified in close proximity to the site are local drainage ditches. These drainage ditches do not represent significant aquatic ecological habitats. The nearest significant surface water bodies are the Plover River, which at its nearest point is approximately 2.0 mi. (3.2 km) northwest of the site, and the Wisconsin River, which at its nearest point is approximately 3.5 mi. (5.6 km) southwest of the site. Both of these are significant ecological habitats, but neither would be directly or indirectly affected by construction or operation of the SHINE facility.

A consultation letter received from the USFWS (2012b) states that the Stevens Point site is within the high potential range of the Karner blue butterfly, a federal Endangered species. The letter recommends conducting a survey for wild lupine, the host plant for the Karner blue butterfly, before proceeding with a project at the site. A survey would be conducted if the Stevens

Point site were to be developed, but at this time there is no indication that either wild lupine or the Karner blue butterfly occurs on the site.

A letter documenting an Endangered Resources Review conducted by the WDNR (2011b) lists four Endangered, Threatened, or Special Concern species known or likely to occur in the project area. These species and their regulatory status are shown in Table 19.5.2-11. The letter indicates that none of these species are likely to occur on the project site, due to lack of suitable habitat. The letter does not list any actions that need to be taken to comply with state or federal endangered species laws, and it does not list any recommendations.

Considering the information presented above, aquatic and terrestrial ecology impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL. The methods used to clear vegetation, control erosion and siltation, and restore temporarily disturbed areas would be selected so as to minimize impacts, as described for the Janesville site in Subsection 19.4.5. No other impact mitigation measures would be required.

19.5.2.1.2.2.7 Historic and Cultural Resources Impacts

No properties listed on the NRHP are located on or in the immediate vicinity of the Stevens Point site. The nearest listed property is Nelson Hall, which is approximately 3.8 mi. (6.1 km) northwest of the northwestern corner of the site. This property is located in a densely populated part of the City of Stevens Point, and it is separated from the site by numerous buildings, roads, trees, and other obstructions. Therefore, this property would not be directly or indirectly affected by construction or operation of the SHINE facility at the Stevens Point site.

The Wisconsin State Archeologist conducted a search of the Wisconsin Historic Preservation Database in order to identify any historic and archeological resources that have been reported in the site vicinity, regardless of whether those resources are listed on the NRHP or not. The database search did not identify any historic or archeological resources that have been reported on the site or within 1 mi. (1.6 km) of the site boundaries. The Wisconsin State Archeologist did not express any concerns about potential construction at the site except that Wisconsin law must be followed if human remains are unearthed or if Native American burial mounds or any marked or unmarked burial is suspected to be present. (Broihahn, 2011)

Field reconnaissance in the site vicinity identified two features that were not identified in the NRHP or the Wisconsin Historic Preservation Database search, but appeared to possibly have historic significance. These features are described below.

A small, unnamed cemetery was observed at the intersection of County Highway HH (McDill Avenue) and Burbank Road southeast of the Stevens Point site. The cemetery was enclosed by a fence and locked gated, but several of the headstones appeared to be quite old. The cemetery is approximately 0.9 mi. (1.4 km) from the nearest part of the site boundary, and it is separated from the site by several existing buildings and scattered trees. It would not be directly affected by construction or operation of the SHINE facility, but it might be indirectly affected by the visual impacts of the facility and/or by increased traffic on County Highway HH and Burbank Road (see Subsection 19.5.2.1.2.2.8). If the Stevens Point site were selected for development, the historical significance of the cemetery and potential impacts on it would have to be evaluated in more detail.

An old school building was observed on Old Highway 18 northeast of the Stevens Point site. A sign on the building read "Stockton School Dist. No. 1 Est. 1857." The building appeared to be a one-room school that is no longer in use. The building is approximately 0.7 mi. (1.1 km) from the nearest part of the site boundary and is separated from the site by a railroad line and scattered trees. It would not be directly affected by construction or operation of the SHINE facility, but it might be indirectly affected by the visual impacts of the facility and/or by increased traffic on Old Highway 18 (see Subsection 19.5.2.1.2.2.8). If the Stevens Point site were selected for development, the historical significance of the school building and potential impacts on it would have to be evaluated in more detail.

Based on the information presented above, it is possible that construction and operation of the SHINE facility at the Stevens Point site could indirectly disturb historic resources, but such impacts cannot be positively determined at this time. On the basis of known historic and cultural resources, there would not be significant impacts. If human remains or archeological artifacts were discovered during construction or operation, the procedures outlined for the Janesville site in Subsection 19.4.6 would be followed. Therefore, cultural resources impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL. There would be no need for impact mitigation measures.

19.5.2.1.2.2.8 Socioeconomic Impacts

This subsection evaluates the social and economic impacts that could result from constructing and operating the SHINE facility at the Stevens Point site. The evaluation includes the impacts of construction and operation activities and the demands placed by the construction and operation workforces on the site and the surrounding region. As discussed in Subsection 19.4.7, the socioeconomic impacts of constructing and operating the SHINE facility at the Janesville site are expected to be largely restricted to Rock County, the county in which the site is located. Socioeconomic impacts in other counties are expected to be minimal and do not require evaluation. It is expected that the socioeconomic impacts of construction and operation at the Stevens Point site would similarly occur primarily in Portage County, the county in which the site is located. Therefore, the following impact evaluation focuses on Portage County. In accordance with the Final ISG Augmenting NUREG-1537, the evaluation considers potential impacts on housing, public services, public education, tax revenues, and transportation.

<u>Housing</u>

Impacts on housing could be caused by construction and operation workers moving, either permanently or temporarily, into the region surrounding the project site (Portage County). This influx of workers could decrease the availability of unoccupied housing units and increase the cost to buy or rent housing. The severity of such impacts would depend primarily on the existing availability of unoccupied housing units compared with the number of workers who would move into the area.

NUREG-1437 establishes the following criteria for judging the severity of impacts on housing:

SMALL - Small and not easily discernible change in housing availability. Increases in rental rates or housing values equal or slightly exceed the statewide inflation rate.

MODERATE - Discernible but short-lived reduction in available housing units. Rental rates and housing values rise slightly faster than the inflation rate, but prices realign quickly once new housing units became available or project-related demand diminishes.

LARGE - Project-related demand for housing units results in very limited housing availability and increases in rental rates and housing values well above normal inflationary increases in the state.

Based on USCB data for 2010, the total number of housing units in Portage County was 30,054, and the number of vacant units was 2240 (USCB, 2012a). As discussed in Subsection 19.4.7, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Portage Countyand the nearby region, but even if all of the workers moved into the county and required housing, the resulting demand for 420 housing units would represent less than 19 percent of the vacant housing units in the county. It is unlikely that this would result in any discernible change in housing availability or an increase in housing costs. Therefore, the housing impact associated with construction of the SHINE facility at the Stevens Point site would be SMALL.

As discussed in Subsection 19.4.7, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the housing impact associated with operation of the SHINE facility at the Stevens Point site would be SMALL.

Public Services

Public services include water supply and waste water treatment facilities; police, fire, and medical services; and social services. Impacts on public services could be caused by construction and operation workers moving into the region surrounding the project site (Portage County). This influx of workers and their families could increase the demand for public services, potentially requiring local governments to add facilities, programs, and/or staff.

Per NUREG-1437, impacts on public services generally are considered to be SMALL if there is little or no need to add facilities, programs, and/or staff because of the influx of workers, and MODERATE or LARGE if additional facilities, programs, and/or staff are required.

USCB estimates that the population of Portage County in 2011 was 70,084, and the average number of people per household was 2.4 (USCB, 2012e). As discussed above, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Portage County and the nearby region, but even if all of the workers moved into the county with the average household size of 2.4 people, the resulting influx of 1,008 people would increase the population of the county by less than 2 percent. It is unlikely that this small population increase would result in a noticeable increase in the demand for public services or a need to add facilities, programs, and/or staff. Therefore, the public services impact associated with construction of the SHINE facility at the Stevens Point site would be SMALL

As discussed above, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the public services impact associated with operation of the SHINE facility at the Stevens Point site would be SMALL.

Public Education

Impacts on public education could be caused by construction and operation workers moving into and bringing school-aged children into the region surrounding the project site (Portage County). This increase in the number of school-aged children could cause crowding of local schools and potentially require school systems to add facilities and/or staff.

Per NUREG-1437, impacts on education are considered to be SMALL if the project-related increase in school enrollment represents less than 3 percent of the total school enrollment in affected school systems, MODERATE if 4 to 8 percent, and LARGE if more than 8 percent.

Based on WDPI data for 2010, the total public school enrollment in Portage County was 9,528 students (WDPI, 2012). As discussed above, the maximum number of workers expected to be employed at any time for construction of the SHINE facility is 420. It is expected that many of these workers would be current residents of Portage County and the nearby region, but if all of the workers moved into the county and brought a school-aged child who attended a public school, the resulting influx of 420 students would increase school enrollment by approximately 4.4 percent. Using the NUREG-1437 guideline, this would indicate a MODERATE impact on education. However, given the conservativeness of the assumption that all construction workers would move into the county, and the fact that the peak construction employment period would last less than 1 year, it is unlikely that the increase in school-aged children would result in noticeable crowding or a need to add facilities or staff. Therefore, the public education impact associated with construction of the SHINE facility at the Stevens Point site would be SMALL

As discussed above, the maximum number of workers expected to be employed at any time for operation of the SHINE facility is 150. This number is significantly smaller than the estimated number of construction workers. Therefore, the public education impact associated with operation of the SHINE facility at the Stevens Point site would be SMALL.

Taxes

Property taxes and other taxes paid during construction and operation of the SHINE facility would benefit the state and local jurisdictions that collect the taxes. Per NUREG-1437, tax impacts are considered SMALL if project-related tax revenues represent less than 10 percent of the total tax revenues of the local taxing jurisdictions, MODERATE if 10 to 20 percent, and LARGE if more than 20 percent.

As discussed in Subsection 19.4.7, SHINE intends to enter into a TIF agreement with the City of Janesville. This agreement is expected to cover the first 10 years of the NRC license period, which includes the construction period for the SHINE facility. Under this agreement, SHINE expects to pay a total of $635,000 per year in property taxes and payments in lieu of taxes. If the SHINE facility were constructed at the Stevens Point site, it is expected that SHINE would enter into a similar TIF agreement and make similar payments during the construction period. Based on WDOR data for Portage County, the property taxes collected in 2011 were $24,819,000 (WDOR, 2012a). Therefore, even if the entire payment of $635,000 per year were counted toward property taxes, the payments would represent approximately 2.6 percent of the annual property tax revenues of Portage County, and the tax impact associated with construction of the SHINE facility at the Stevens Point site would be SMALL.

After expiration of the 10-year TIF agreement with the City of Janesville, SHINE expects to pay property taxes of approximately $660,000 per year during the remaining period of operation for the SHINE facility. It is expected that tax payments at the Stevens Point site would be approximately the same, and such payments would represent approximately 2.7 percent of the annual property tax revenues of Portage County. Therefore, the tax impact associated with operation of the SHINE facility at the Stevens Point site would be SMALL.

Transportation

Transportation in the vicinity of the SHINE facility could be affected by the increase in vehicle traffic associated with construction and operation workers commuting to and from the site and the delivery of materials and equipment to the site. The increase in vehicle traffic could cause congestion and delays on local roads. The severity of such impacts would depend primarily on the existing road conditions and traffic volumes on the local roads compared with the expected volume of project-related traffic.

As shown in Figure 19.5.2-7, the entrance road for the SHINE facility would connect with a new street that the City of Stevens Point has indicated they would construct along the northern boundary of the site. It is expected that this new street would connect with County Highway R (Eisenhower Road), an existing public road located approximately 1.0 mi. (1.6 km) west of the site, and Burbank Road, an existing public road located approximately 1.5 mi. (2.4 km) east of the site. The City also has indicated that they would construct a new street along the western boundary of the site, between the new street to the north and County Highway HH (McDill Avenue), an existing public road to the south. No other construction or modification of roads or other transportation infrastructure would be required for construction, operation, or decommissioning of the SHINE facility.

Interstate-39 provides long-distance access to the site area. The exit nearest to the site is Exit 156, which is approximately 1.5 mi. (2.4 km) southwest of the site and connects with County Highway HH. Exit 158, which is approximately 2 mi. (3.2 km) northwest of the site, connects with U.S. Highway 10. Thus, it is expected that most vehicles traveling to the site from outside of the Stevens Point metropolitan area would travel on County Highway HH or U.S. Highway 10, then turn onto County Highway R, and then turn onto the new street to be constructed along the northern boundary of the site. Many vehicles traveling to the site from inside of the metropolitan area probably also would travel on County Highways R and HH, although some might travel on Old Highway 18 or Burbank Road, which are the nearest existing public roads to the north and east of the site, respectively.

U.S. Highway 10 is a multi-lane divided highway. County Highway R is an undivided four-lane road with a curbed shoulder. County Highway HH, Old Highway 18, and Burbank Road are two lane roads with minimal paved shoulders. Old Highway 18 and Burbank Road are narrow and do not have painted center stripes.

Table 19.5.2-12 provides peak hourly traffic data for the roads in the site area (WDOT, 2011). It can be seen that the traffic volume on these roads varies greatly. Most relevantly, however, the traffic volume on County Highway R in the site area (south of U.S. Highway 10) is around 400 vehicles per hour during the morning peak period and around 700 vehicles per hour during the evening peak period. The traffic volume on County Highway HH is around 350 vehicles per hour during the morning peak period and around 500 vehicles per hour during the evening peak

period. The traffic volume on both Old Highway 18 and Burbank Road is less than 50 vehicles per hour during both the morning and evening peak periods.

As discussed in Subsection 19.4.7, the maximum number of vehicles expected to travel to and from the site during construction of the SHINE facility is 465 per day. The great majority of these vehicles (approximately 420) would represent commuting construction workers. These vehicles generally would arrive at the site on County Highway R at about the same time each morning and leave on County Highway R at about the same time each evening. Thus, commuting construction workers could roughly double the volume of traffic on County Highway R during the peak morning period. The increase in traffic volumes on other roads in the site vicinity would not be as great but could be significant. Given the low existing traffic volumes and relatively poor road conditions on Old Highway 18 and Burbank Road, any appreciable increase in traffic could be significant for these roads.

Considering the nature of the roads in the site vicinity and the increase in traffic volume these roads would experience, it is likely that the peak construction-related traffic would noticeably alter existing transportation conditions (cause noticeable traffic delays) but not be sufficient to destabilize transportation resources. Therefore, the transportation impact associated with project construction would be MODERATE.

As discussed in Subsection 19.4.7, the maximum number of vehicles expected to travel to and from the site during operation of the SHINE facility is 118 per day. The great majority of these vehicles would represent commuting operation workers, but it is expected that these workers would be divided into three shifts. Thus, the maximum number of vehicles arriving at or departing from the site at any one time would be much less than during the construction period. Therefore, the transportation impact associated with facility operation would be SMALL.

In order to alleviate traffic congestion during project construction, mitigation measures such as widening or adding turning lanes might be necessary, especially on Old Highway 18 and Burbank Road. Specific mitigation measures would be selected after a detailed evaluation of traffic patterns and potential problem areas.

19.5.2.1.2.2.9 Human Health Impacts

19.5.2.1.2.2.9.1 Nonradiological Impacts

No unusual existing sources of nonradioactive chemical exposure or effluents have been identified in the vicinity of the Stevens Point site. No operating industrial facilities with environmental monitoring programs have been identified in the site vicinity.

A SHINE facility at the Stevens Point site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.8.1 with regard to the following factors:

- Nonradioactive chemical sources (location, type, strength).
- Nonradioactive liquid, gaseous, and solid waste management and effluent control systems.
- Nonradioactive effluents released into the on-site and off-site environment.
- Chemical exposure to the public and on-site workforce.
- Physical occupational hazards.
- Mitigation measures for nonradiological human health impacts.

Nonradiological chemical sources, wastes, effluents, and occupational hazards associated with the SHINE facility would be strictly controlled to ensure compliance with applicable environmental and occupational regulations and standards as discussed in Subsection 19.4.8.1. Therefore, the nonradiological human health impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL.

19.5.2.1.2.2.9.2 Radiological Impacts

No unusual existing sources of radiation have been identified in the vicinity of the Stevens Point site. The major sources and levels of background radiation exposure at the Stevens Point site are very similar to the sources and levels described for the Janesville site in Subsection 19.3.8.2.

The physical layout of the Stevens Point site is shown in Figure 19.5.2-7. Radioactive materials would be located in the central part of the production facility building. A SHINE facility at the Stevens Point site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.8.2 with regard to the following factors:

- Characteristics of radiation sources and expected radioactive effluents.
- Compliance with 10 CFR 20.1301, including calculated radiation dose rates at the site boundary.
- Annual radiation dose to the maximally exposed worker.
- Mitigation measures to minimize public and occupational exposures to radioactive material.

Radiation sources and radioactive effluents would be strictly controlled to ensure compliance with applicable regulations and standards as discussed in Subsection 19.4.8.2. Therefore, the radiological human health impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL.

19.5.2.1.2.2.10 Waste Management Impacts

No conditions have been identified for the Stevens Point site that would significantly affect waste management impacts. A SHINE facility at the Stevens Point site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.9 with regard to the following factors:

- Sources, types, and approximate quantities of solid, hazardous, radioactive, and mixed wastes.
- Proposed waste management systems designed to collect, store, and process the waste.
- Anticipated waste disposal or waste management plans.
- Anticipated waste-minimization plans to minimize the generation of waste.

Wastes would be handled, processed, stored, and disposed as discussed in Subsection 19.4.9. Therefore, the waste management impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL.

19.5.2.1.2.2.11 Waste Management Impacts

Per the Final ISG Augmenting NUREG-1537, the traffic impacts of vehicles associated with the SHINE project are discussed in Subsection 19.5.2.1.2.2.8. This subsection discusses the radiological and other human health impacts of transporting nuclear and non-nuclear materials associated with the project.

No conditions have been identified for the Stevens Point site that would significantly affect the impacts of transporting nuclear and non-nuclear materials, including radioactive waste, nonradioactive waste, and medical isotopes. Because the Stevens Point site and the Janesville site are relatively close to each other in comparison with the projected origins and destinations of nuclear and non-nuclear materials, distance-related impacts of transportation would be essentially the same. A SHINE facility at the Stevens Point site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.10 with regard to the following factors:

- Transportation modes.
- Approximate transportation distances.
- Treatment and packaging for radioactive and nonradioactive wastes.
- Calculated radiological dose to members of the public and workers from incident-free transportation scenarios.

The impact of the transportation of nuclear and non-nuclear materials is discussed in Subsections 19.4.10.1.3 and 19.4.10.2 . Therefore, the transportation impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL.

19.5.2.1.2.2.12 Postulated Accident Impacts

No conditions have been identified for the Stevens Point site that would significantly affect the radiological and nonradiological impacts from postulated accidents. A SHINE facility at the Stevens Point site would be essentially the same as the SHINE facility described for the Janesville site in Subsection 19.4.11 with regard to the following factors:

- Credible accidents having a potential for releases into the environment.
- Radiological and nonradiological consequences from the postulated accidents.

The SHINE facility would be designed, constructed, and operated to ensure that the consequences of postulated accidents would comply with applicable regulations and standards, as discussed in Subsection 19.4.11. Therefore, the postulated accident impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL.

19.5.2.1.2.2.13 Environmental Justice Impacts

Environmental justice issues involve aspects of the project that could disproportionately impact minority or low-income populations. The potential for disproportionate impacts depends primarily on the location of the project facilities in relation to existing minority and low-income populations.

Minority and low-income populations within 5 mi. (8 km) of the Stevens Point site were identified based on USCB Census block group data (USCB, 2012c and 2012d). Census block groups with above-average minority and low-income populations were determined by comparing the minority

and poverty populations in each block group to the total population in that block group and to the average minority and poverty populations in the county and state. Where the minority or poverty population in a block group exceeded 50 percent of the total population in that block group, or where the minority or poverty population was found to be at least 20 percentage points greater than the comparable county and/or state averages, the minority or poverty population was defined as "above average." This methodology is consistent with NRC guidance for identification of Environmental Justice populations (NRC, 2004).

Table 19.5.2-13 shows the block groups and census tracts within 5 mi. (8 km) of the Stevens Point site, the percentage of households below the poverty level in each, and the percentage of each minority group, including American Indian and Hispanic populations, in each. The percentage of households below the poverty level, the percentage of each minority group, and aggregate percentage of all minority groups are compared with the average percentage in Portage County and the state of Wisconsin.

As shown in Table 19.5.2-13, none of the block groups/census tracts within 5 mi. (8 km) of the Stevens Point site has an above average percentage of any minority groups individually or in the aggregate, but four block groups/census tracts have an above average percentage of households below the poverty level. These block groups/census tracts have 36.4 to 59.5 percent of households below the poverty level, compared with 12.4 percent in Portage County and 11.2 percent in the state of Wisconsin. The location of these block groups/census tracts is shown in Figure 19.5.2-9. It can be seen that all of the block groups/census tracts are located west-northwest of the Stevens Point site, with the nearest one being approximately 3.5 mi. (5.6 km) from the site. All of the block groups/census tracts are located on the far side of the City of Stevens Point, and all are separated from the site by numerous buildings, roads, trees, and other obstructions. None of the primary transportation routes that would be used to transport workers, materials, or equipment to the Stevens Point site pass through these block groups/ census tracks. Therefore, these populations would not be directly or indirectly affected by construction or operation of the SHINE facility at the Stevens Point site.

No American Indian reservations or other special communities have been identified within 5 mi. (8 km) of the Stevens Point site. The nearest American Indian reservation is the Winnebago Reservation, which belongs to the Ho-Chunk Nation and is located approximately 20 mi. (32 km) southwest of the site (National Atlas of the United States, 2012; WDNR, 2012b).

Based on the information presented above, there is no indication that any minority or low income population would be disproportionately affected during project construction or operation as compared to the effect on the general population. Based on the potential for disproportionate exposure to environmental hazards from the SHINE facility as well as multiple-hazard and cumulative hazard conditions, the human health and environmental effects on minority and low-income populations would not be significantly high or adverse. Therefore, the environmental justice impacts associated with construction and operation of the SHINE facility at the Stevens Point site would be SMALL

19.5.2.1.2.2.14 Cumulative Impacts

Past, present, and reasonably foreseeable future development projects and other actions that could result in cumulative impacts at the Stevens Point site were identified by searching for economic development plans, permit lists, news releases, and similar sources of information. An effort was made to identify all relevant activities conducted, regulated, or approved by a federal agency or non-federal entity within 5 mi. (8 km) of the site. Available information about the projects and other activities identified is provided in Table 19.5.2-14.

As shown in Table 19.5.2-14, the projects and other activities located within 5 mi. (8 km) of the Stevens Point site generally are of a relatively small scale and would not be expected to have significant impacts in the same areas affected by the SHINE facility. Construction of a new ethanol plant, as planned by Central Wisconsin Alcohol, Inc. approximately 1 mi. (1.6 km) from the Stevens Point site might have contributed to the land use impacts of the SHINE facility; however, the air construction permit application for this project recently was rejected and it is not clear that the project will proceed. The projects that are proceeding or appear likely to proceed would not be expected to have significant land use impacts. However, some of these projects could produce increases in vehicle traffic and ambient noise that might affect some of the same areas as the SHINE facility. Therefore, the cumulative effects of these projects might contribute to the traffic and noise impacts of the SHINE facility, which are expected to be MODERATE as discussed above.

19.5.2.2 ALTERNATIVE TECHNOLOGIES

19.5.2.2.1 Identification of Reasonable Alternatives

The SHINE facility uses a new, proprietary technology developed by SHINE in order to domestically produce medical isotopes such as Mo-99, I-131, and Xe-133. The U.S. Department of Energy (DOE) has provided support to SHINE and three additional technologies for the domestic production of medical isotopes (NRC, 2011). The DOE conducted a rigorous technical review of proposed technologies for producing Mo-99 domestically before selecting its four cooperative agreement partners. The DOE intentionally chose four distinct technologies to support. Rather than repeat this selection process for the purpose of this section, the three other DOE cooperative agreement partner technologies were selected as the alternative technologies to be considered in this section.

The three technologies considered were:

- Linear accelerator-based technology (for production of Mo-99 only).
- Neutron capture using existing power reactors (for production of Mo-99 only).
- Low enriched uranium (LEU) aqueous homogenous reactors.

Each of these technologies were evaluated to determine if they could reasonably be implemented at the Janesville site. While both an aqueous homogeneous reactor and linear accelerator facility could concievably be built at the SHINE site, there is no power reactor at the site. As a result, neutron capture in an existing power reactor was considered unreasonable for the purpose of this section and eliminated from the list.

The two remaining technologies are considered reasonable alternatives to the SHINE technology for the Janesville site and are evaluated in the following subsections. However, as noted below,

the linear accelerator-based approach is not able to produce medical isotopes other than Mo-99, and therefore, does not address the need for domestic SHINE as effectively as the SHINE technology.

19.5.2.2.2 Evaluation of Reasonable Alternatives

The two alternative technologies evaluated are as follows:

- Linear accelerator-based approach (for production of Mo-99 only).
- Low enriched uranium (LEU) aqueous homogeneous reactor approach.

The following subsections describe these alternative technologies in more detail and evaluate the major environmental impacts associated with construction and operation of the technologies at the SHINE site. Cumulative impacts and potential impact mitigation measures would be largely determined by the project site conditions, and therefore, would be the same as described for the SHINE facility in Subsection 19.4.13.

19.5.2.2.2.1 Linear Accelerator Approach (Production of Mo-99 Only)

19.5.2.2.2.1.1 Description

This technology uses multiple linear accelerators to produce Mo-99. The linear accelerator accelerates electrons that collide with a metal target, producing extremely intense high-energy photons. The high energy photons irradiate a target made of molybdenum-100 (Mo-100), producing Mo-99 (CLS, 2012). The Mo-99 is shipped to pharmacies for TechneGen™ processing and Tc-99m generation. The design allows for increasing production when required by demand.

19.5.2.2.2.1.2 Land Use and Visual Resources Impacts

The linear accelerator SHINE facility for this technology is 77,000 square (sq.) ft. (7200 sq. m) in size and requires an approximately 33 ac. site (13.4 ha) (DOE, 2012). The size of the facility is similar to the size of the SHINE facility, and it would be expected to have similar impacts on land use and visual resources (see Subsection 19.4.1). Therefore, the land use and visual impacts of construction and operation would be SMALL.

19.5.2.2.2.1.3 Air Quality and Noise Impacts

Construction activities associated with the proposed facility would generate air pollutant emissions from site-disturbing activities, such as grading, filling, compacting, trenching, and operation of construction equipment. The maximum annual greenhouse gas emissions would be about 0.037 percent of Wisconsin's 2009 carbon dioxide emissions (DOE, 2012).

The proposed facility would produce air emissions from operation of the building's heating system. Process emissions would not be expected, but the use of chemicals used to dissolve Mo-99 targets and the resulting evaporation could result in small emissions. Operations emissions under the proposed project would not be expected to (1) cause or contribute to a violation of any Federal or State ambient air quality standard; (2) expose sensitive receptors to substantially increased pollutant concentrations; or (3) exceed any evaluation criteria established by a State implementation plan. Operation of the facility would also result in an increase in vehicular emissions and noise due to shipping radioisotopes and operating and maintaining the

facility. Noise would stem from the operation of linear accelerator and chemical processing equipment. While operations are likely to produce considerable noise, the noise would be contained within the production facility and would have no impact on the surrounding ambient noise levels. Employees working in this environment would follow best management practices, such as the use of hearing protection equipment, as necessary to limit exposure above the permissible levels defined by the Occupational Safety and Health Administration (DOE, 2012). Therefore, the air quality and noise impacts of construction and operation would be SMALL.

19.5.2.2.2.1.4 Geology, Soils, and Seismology Impacts

The linear accelerator SHINE facility would be designed to withstand the same seismic and geologic hazards as the SHINE facility. Construction of the linear accelerator SHINE facility would require some excavation and the use of some geologic resources for fill material. No information on the design of the linear accelerator SHINE facility is available except the size, but the need for excavation and geologic resources should be similar to those described for the SHINE facility in Subsection 19.4.3. Therefore, the geology, soils, and seismology impacts during construction and operation would be SMALL.

19.5.2.2.2.1.5 Water Resources Impacts

Construction of the proposed facility and associated parking areas and roadways would likely involve conversion of less than 2 hectares (5 acres) of the property to impervious surface. This would result in a slight increase in potential runoff from the project site compared with the site's undeveloped state. Facility operations would not be expected to require direct withdrawals of groundwater, as all required water would be obtained from municipal supplies (DOE, 2012). The water resource impacts would be similar to those described for the SHINE facility in Subsection 19.4.4. Therefore, the water resource impacts during construction and operation would be SMALL.

19.5.2.2.2.1.6 Ecological Resources Impact

Since the linear accelerator SHINE facility is similar in size to the SHINE facility, the ecological resource impacts would be similar to those described for the SHINE facility in Subsection 19.4.5. Therefore, the ecological impacts of construction and operation would be SMALL.

19.5.2.2.2.1.7 Historic and Cultural Resources Impacts

Since the linear accelerator SHINE facility is similar in size to the SHINE facility, the historical and cultural resource impacts would be similar to those described for the SHINE facility discussed in Subsection 19.4.6. Therefore, the historical and cultural resource impacts of construction and operation would be SMALL.

19.5.2.2.2.1.8 Socioeconomic Impacts

Construction of the linear accelerator SHINE facility would have a positive socioeconomic impact related to employment and tax revenues. Operation of the facility would create 150 jobs (HI, 2011) as well as provide additional tax revenues and alleviate shortages of medical isotopes. These beneficial impacts, as well as potential adverse impacts on public services and transportation, would be similar to those described for the SHINE facility in Subsection 19.4.7. Therefore, the socioeconomic impacts of construction and operation would be SMALL.

19.5.2.2.2.1.9 Human Health Impacts

Construction would entail potential hazards to workers typical of any construction site. Normal construction safety practices would be employed to promote worker safety and reduce the likelihood of worker injury during construction. Nonetheless, construction accidents could occur.

Air emissions from the facility have the potential to contain radioactive material as a result of the accelerator operations and the dissolution and packaging of radioactive materials in the hot cells. However, the facility design and operation would be intended to control the amount of radioactive material released to a negligible amount. Liquid waste generated during operations would be collected, temporarily stored on-site, and sent off-site for treatment and disposal. The proposed facility would not release any radioactive material through wastewater. No public dose from air emissions or wastewater is expected. Although radiological emissions would not be expected, if any emissions were to occur, impacts on the public would be negligible (DOE, 2012).

The potential sources of exposure for the workers include the activities associated with the linear accelerator irradiation of the Mo-100 targets, transfer of irradiated material into the hot cells, packaging and shipment of the Mo-99 product, and preparation of any radioactive waste for disposal. The Mo-99 production facility design and operation would include several features to limit worker dose. Only a fraction of the workers at the Mo-99 production facility would be expected to receive any radiation dose; individual worker doses would not exceed the 5-rem-per-year regulatory limit (DOE, 2012). The human health impacts of construction and operation would be SMALL.

19.5.2.2.2.1.10 Waste Management Impacts

Excavation of the subgrade portion of the facility would generate up to 23,000 cubic meters (30,000 cubic yards) of soil/rock that would be disposed of off-site if not used for on-site grading. The soil/rock material would be recycled/reused as construction fill for other construction or grading purposes, if the material properties are acceptable. Construction activities would generate about 160 metric tons (175 tons) of solid waste in the form of wood, metal, concrete, or other miscellaneous construction debris. Construction waste would be recycled to the extent practicable or disposed of at an appropriate licensed landfill or waste management facility (DOE, 2012).

Operation of this type of facility would be expected to result in waste generation during the process of bombarding targets and preparing the Mo-99 product for shipment. About 10.4 cubic meters (14 cubic yards) of low-level radioactive waste, 2.4 cubic meters (3.1 cubic yards) of hazardous waste, and 45 cubic meters (59 cubic yards) of solid waste would be generated annually. No mixed low-level radioactive waste generation would be expected. Existing commercial or municipal treatment and disposal facilities would be able to accommodate all projected quantities of waste generated by the proposed facility (DOE, 2012).

No process-water discharges would be expected. Sanitary waste from the facility would be discharged to the sanitary sewer system; the quantity of waste, primarily from personnel water use, would be a small addition to the load on the local sewer system (DOE, 2012). The waste management impacts of construction and operation would be SMALL.

19.5.2.2.2.1.11 Transportation Impacts

Low-level radioactive waste would be shipped by truck and/or rail to waste disposal facilities, and Mo-99 would be shipped by air for processing. The transportation impacts would be similar or less (since there would be no fission product wastes) than those for the SHINE facility discussed in Subsection 19.4.10. Therefore, the transportation impacts would be SMALL.

19.5.2.2.2.1.12 Postulated Accidents Impacts

A range of accidents involving radioactive Mo-99 or chemicals to be used in the process was postulated. Risks to the public from most postulated accidents would be small. Impacts of extremely unlikely severe accidents, such as building collapse from an earthquake or explosion, could extend to members of the public. A severe accident causing release of the entire helium inventory (from the linear accelerator target-cooling system) could result in dispersion of hazardous concentrations to a distance of about 85 meters (280 feet) from the building; the distance from the building to the site boundary is about 20 meters (66 feet). A severe accident involving direct exposure to a freshly irradiated molybdenum target would result in a risk of a latent cancer fatality of 7×10^{-4} (1 chance in 1,400) to someone exposed at the site boundary for an hour. Although considered extremely unlikely, an intentional destructive act involving release of a significant portion of a freshly-irradiated target would result in a risk of a latent cancer fatality of 8×10^{-5} to 3×10^{-4} (1 chance in 3,000 to 13,000) to a person at the site boundary (DOE, 2012). The environmental impact of postulated accidents would be SMALL.

19.5.2.2.2.1.13 Environmental Justice Impacts

Environmental justice impacts are largely dependent on the site location, and since the alternative technologies are assumed to be constructed at the SHINE site, the impacts would be similar to those described for the SHINE facility in Subsection 19.4.12. Given that the impacts in all environmental resource areas discussed above would be SMALL, the environmental justice impacts of construction and operation would be SMALL.

19.5.2.2.2.2 Low Enriched Uranium Aqueous Homogeneous Reactor Approach (Production of Mo-99, I-131 and Xe-133)

19.5.2.2.2.2.1 Description

This process consists of an array of aqueous homogeneous reactors (AHR) to produce Mo-99, I-131 and Xe-133. The AHR uses an LEU uranyl nitrate solution for fuel and target material. Once produced, these isotopes are extracted and sent for processing, distribution to pharmacies, and Tc-99m generation. This technology has the potential to supply more than 50 percent of the US demand for Mo-99 (B&W TSG, 2009a).

The facility consists of a small number of AHR modules, each with a generating capacity of 200 to 240 kilowatt (kW), less than 1 MW total (B&W TSG, 2009b). The use of LEU uranyl nitrate solution for both reactor fuel and target material allows Mo-99 to be produced in the entire reactor solution. The design reduces waste production and proliferation issues, and allows for a large negative coefficient of reactivity, passive safety factor, operating temperature of 80 degrees Celsius (°C) (176°F [degrees Fahrenheit]), and atmospheric operating pressure (B&W TSG, 2009c). The low power and small footprint of the AHR modules allows for additional facilities

and/or increased production at the first facility. To produce Mo-99, I-131, and Xe-133, LEU is dissolved in nitric acid and brought to criticality. To extract these isotopes, the solution is transferred from the reactor to a vent tank. After degassing, the solution is transferred to an extraction column where it undergoes nitric acid wash, water wash, and sodium hydroxide elution processes. The processed solution is cleaned up and returned to the reactor (B&W TSG, 2009b; B&W TSG, 2009c).

19.5.2.2.2.2.2 Land Use and Visual Resources Impacts

There is no information on the size of this type of facility. It is anticipated the size would be similar to the SHINE facility (see Subsection 19.4.1) (B&W TSG, 2009c). Therefore, the land use and visual resource impacts of construction and operation would be SMALL.

19.5.2.2.2.2.3 Air Quality and Noise Impacts

Construction of the facility results in an increase in dust and vehicular emissions and noise. Operation of the facility results in an increase in vehicular emissions and noise due to shipping radioisotopes and operating and maintaining the facility. The air quality and noise impacts would be similar to those described for the SHINE facility in Subsection 19.4.2. Therefore, the air quality and noise impacts of construction and operation would be SMALL.

19.5.2.2.2.2.4 Geology, Soils, and Seismology Impacts

The facility would be designed to withstand the same seismic and geologic hazards as the SHINE facility. Construction of the facility would require some excavation and the use of some geologic resources for fill material. No information on the design of the facility is available, but the need for excavation and geologic resources should be similar to those described for the SHINE facility in Subsection 19.4.3. Therefore, the geology, soils, and seismology impacts during construction and operation would be SMALL.

19.5.2.2.2.2.5 Water Resources Impacts

There is no information on the water requirements for this type of facility. However, the water requirements are anticipated to be greater than that of the SHINE facility (see Subsection 19.4.4) (B&W TSG, 2009c). However, the water resource impacts of construction and operation would likely be SMALL.

19.5.2.2.2.2.6 Ecological Resources Impact

There is no information on the size of this type of facility. However, the size is likely to be similar to the SHINE facility (B&W TSG, 2009c). Therefore, the ecological resource impacts of construction and operation would be similar to those described for the SHINE facility in Subsection 19.4.5 and the impacts would be SMALL.

19.5.2.2.2.2.7 Historic and Cultural Resources Impacts

There is no information on the size of this type of facility. However, the size is likely to be similar to the SHINE facility (B&W TSG, 2009c). Therefore, the historic and cultural resource impacts of construction and operation would be similar to those described for the SHINE facility in Subsection 19.4.6 and the impacts would be SMALL.

19.5.2.2.2.2.8 Socioeconomic Impacts

Construction of the facility would have a positive socioeconomic impact related to employment and tax revenues. While there is no information on the number of jobs that would be created by operating this type of facility, it is likely to be similar to the operation of the SHINE facility. Operation also would provide additional tax revenues and alleviate shortages of medical isotopes. These beneficial impacts, as well as potential adverse impacts on public services and transportation, would be similar to those described for the SHINE facility in Subsection 19.4.7. Therefore, the socioeconomic impacts of construction and operation would be SMALL.

19.5.2.2.2.2.9 Human Health Impacts

There is no information available on this type of facility to directly assess the human health impacts of its construction and operation. However, the radiological and nonradiological human health impacts of this type of facility (B&W TSG, 2009b) is likely to be greater than those of the SHINE facility (see Subsection 19.4.8). However, the human health impacts of construction and operation are likely to be SMALL.

19.5.2.2.2.2.10 Waste Management Impacts

There is no information available on this type of facility to directly assess the radiological and nonradiological waste management impacts of its construction and operation. However, given the similar Mo-99 production levels, the waste production is anticipated to be similar to the SHINE facility (see Subsection 19.4.9). Therefore, the waste management impacts of construction and operation are likely to be SMALL.

19.5.2.2.2.2.11 Transportation Impacts

There is no information available on this type of facility to directly assess transportation impacts. However, given the similar Mo-99 production levels, the impacts of transporting spent fuel and radioactive waste from this type of facility is anticipated to be similar to those of the SHINE facility (see Subsection 19.4.10). Transportation impacts due to the shipment of Mo-99, I-131, and Xe-133 to processing facilities would be similar to the impact of shipping isotopes from the SHINE facility as described in Subsection 19.4.10. Therefore, environmental impacts due to transportation would be SMALL.

19.5.2.2.2.2.12 Postulated Accidents Impacts

There is no information available on this type of facility to directly assess the impacts of postulated accidents. However, the postulated accident impacts of this type of facility are anticipated to be greater than those of the SHINE facility (see Subsection 19.4.11). Regardless, the environmental impact of postulated accidents would be SMALL.

19.5.2.2.2.2.13 Environmental Justice Impacts

Environmental justice impacts are largely dependent on the site location, and since the alternative technologies are assumed to be constructed at the SHINE site, the impacts would be similar to those described for the SHINE facility in Subsection 19.4.12. Given that the impacts in all environmental resource areas discussed above would be SMALL, the environmental justice impacts of construction and operation would be SMALL.

Table 19.5.2-1 Sensitive Features in the Chippewa Falls Site Area

	Measured from Site Nearest Boundary	Measured from Center Point
Nearest Residence 1	0.07 mi. (0.12 km)	0.40 mi. (0.65 km)
Nearest Residence 2	0.12 mi. (0.19 km)	0.39 mi. (0.63 km)
Monkey Business Child Care Center	0.21 mi. (0.34 km)	0.40 mi. (0.65 km)
Grace Adult Day Services	0.49 mi. (0.79 km)	0.64 mi. (1.04 km)
Oral & Maxillofacial Associates	0.58 mi. (0.93 km)	0.74 mi. (1.19 km)
Lakeland College and Chippewa Valley Technical College	0.56 mi. (0.90 km)	0.70 mi. (1.13 km)
Family Health Associates	0.55 mi. (0.89 km)	0.70 mi. (1.13 km)
Chippewa Valley Eye Clinic	0.54 mi (0.86 km)	0.69 mi. (1.12 km)
Wissota Health and Regional Vent Center	0.69 (1.12 km)	0.88 mi. (1.41 km)
Marshfield Clinic Chippewa Falls Center	0.64 mi. (1.03 km)	0.84 mi. (1.35 km)
St. Joseph's Hospital	0.65 mi. (1.05 km)	0.82 mi. (1.32 km)
Wissota Sprints Assisted Living Center	0.63 mi. (1.01 km)	0.81 mi. (1.31 km)
Marshfield Clinic Chippewa Falls Dental Center	0.69 mi. (1.11 km)	0.93 mi. (1.50 km)
Kids USA Learning Center	0.81 mi. (1.30 km)	1.00 mi. (1.60 km)
Sunrise Family Care Clinic	0.77 mi. (1.24 km)	0.95 mi. (1.53 km)
Irvine Park (nearest public park)	1.45 mi. (2.34 km)	1.79 mi. (2.89 km)
Notre Dame Church and Goldsmith Chapel (nearest listed historical site)	1.85 mi. (2.98 km)	2.11 mi. (3.40 km)
Parkview Elementary School (nearest public school)	1.50 mi. (2.41 km)	1.79 mi. (2.88 km)

Table 19.5.2-2 Potential Land Use and Natural Habitat Impacts at the Chippewa Falls Site (USGS, 2006)

Land Use Category	Permanently Developed Area	Temporarily Disturbed Area	Remaining Area within Site Boundaries	Total Within Site Boundaries	Total Witin 5-Mile Radius	Percentage of 5-Mile Radius within Site Boundaries
Developed land	2.6 ac. (1.0 ha)	0.01 ac. (0.004 ha)	6.5 ac. (2.6 ha)	9.1 ac. (3.7 ha)	8,966.4 ac. (3,628.6 ha)	0.10%
Cultivated Crops	14.9 ac. (6.0 ha)	13.7 ac. (5.5 ha)	37.9 ac. (15.4 ha)	66.5 ac. (26.9 ha)	19,133.0 ac. (7,742.9 ha)	0.35%
Pasture/Hay	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	3,237.0 ac. (1,310.0 ha)	0.0%
Grassland/Herbaceous	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	895.6 ac. (362.4 ha)	0.0%
Shrub/Scrub	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	568.9 ac. (230.2 ha)	0.0%
Deciduous Forest	0.5 ac. (0.2 ha)	0 ac. (0 ha)	0.3 ac. (0.1 ha)	0.8 ac. (0.3 ha)	7,301.3 ac. (2,954.7 ha)	0.01%
Evergreen Forest	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	1,116.1 ac. (451.7 ha)	0.0%
Mixed Forest	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	495.9 ac. (200.7 ha)	0.0%
Woody Wetlands	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	1,268.9 ac. (513.5 ha)	0.0%
Emergent, Herbaceous Wetlands	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	732.8 ac. (296.5 ha)	0.0%
Open Water	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	6,549.0 ac. (2,650.3 ha)	0.0%
Barren Land (Rock/Sand/Clay)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0.0%
Totals	17.9 ac. (7.3 ha)	13.7 ac. (5.5 ha)	44.8 ac. (18.1 ha)	76.4 ac. (30.9 ha)	50,264.9 ac. (20,341.5 ha)	0.15%

Table 19.5.2-3 Plant Species Oberved at the Chippewa Falls Site (Sheet 1 of 2)

Site Locale	Scientific Name	Common Name
Cultivated Field Edges	*Bromus inermis*	smooth brome
	Cirsium vulgare	thistle
	Festuca elatior	fescue
	Picea sp. (treeline to north)	spruce
	Pinus resinosa (treeline to north)	red pine
	Poa pratensis	Kentucky bluegrass
	Populus deltoides (treeline to north)	cottonwood
	Rubus sp. (treeline to north)	blackberry
	Setaria glauca	foxtail grass
	Solidago sp. (treeline to north)	goldenrod
	Symphyotrichum sp.	aster
	Taraxicum officinale	common dandelion
	Trifolium repens	white clover
Wetland Community	*Eleocharis sp.*	spikerush
	Phalaris arundinacea	reed canary grass
	Rumex sp.	dock
	Scirpus cyperinus	woolgrass
	Typha latifolia	common cattail

Table 19.5.2-3 Plant Species Oberved at the Chippewa Falls Site (Sheet 2 of 2)

Site Locale	Scientific Name	Common Name
Oldfield/Railroad ROW	*Ambrosia artemisiifolia*	common ragweed
	Amorpha canescens	leadplant
	Andropogon gerardii	big bluestem
	Aristida sp.	three-awned grass
	Asclepias syriaca	common milkweed
	Aster nove-angliae	New England aster
	Bromus inermis	smooth brome
	Cornus species	dogwood species
	Festuca elatior	fescue
	Lespedeza captitata	prairie bush clover
	Monarda fistulosa	wild bergamot
	Poa pratensis	Kentucky bluegrass
	Populus deltoides	cottonwood
	Populus tremuloides	trembling aspen
	Rubus flagellarus	dewberry
	Rubus sp.	blackberry
	Rudbeckia hirta	black-eyed susan
	Schizachyrium scoparium	little bluestem
	Setaria glauca	foxtail grass
	Solidago sp.	goldenrod
	Symphyotrichum sp.	aster

Table 19.5.2-4 Endangered Resources Known or Likely to Occur in the Chippewa Falls Site Area [a]

	Scientific Name	Common Name	State Status	Global Rank [b]	State Rank [c]
Birds	*Haliaeetus leucocephalus*	Bald eagle [d]	Special Concern (Fully Protected) [e]	G5	S4 (breeding); S4 (non-breeding)
Fish	*Acipenser fulvescens*	lake sturgeon	Special Concern (Regulated by harvest seasons) [e]	G3; G4	S3
	Moxostoma valenciennesi	greater redhorse	Threatened [f]	G4	S3
Insects	*Ophiogomphus smithi*	sand snaketail	Special Concern (No regulations) [e]	G2; G3	S3

a) Species designated by the WDNR in Endangered Resources Review (WDNR, 2011a).
b) Global ranking system ranging from G1: critically imperiled globally to G5: common, widespread, and abundant as described in the Wisconsin Natural Heritage Working List.
c) State ranking system ranging from S1: critically imperiled in Wisconsin to S5: demonstrably secure in Wisconsin as described in the Wisconsin Natural Heritage Working List.
d) Bald eagles are not expected to be present on project site due to lack of suitable habitat; however, as a result of Federal protection under the Bald & Golden Eagle Protection Act and Migratory Bird Act, Wisconsin DNR must be contacted if individuals begin to nest in or near site.
e) Classification signifying an issue with abundance or distribution to increase awareness before species becomes threatened or endangered. Species not legally protected by state or federal endangered species laws, but may be protected by other laws, policies, or permitting processes requiring or strongly encouraging protection of these resources.
f) The term "threatened" is defined in the Endangered Species Act as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range".

Table 19.5.2-5 Annual Average Hourly Traffic Counts in the Chippewa Falls Site Area

	Annual Average Hourly Traffic (WDOT, 2011)			
	AM Peak [a]	**Middday Peak [b]**	**PM Peak [c]**	**Daily Total**
County Highway S between WI-124 and 149th Street	430	298	405	4,573
County Highway S west of WI-178	338	222	362	3,831
WI-178 between Lake View and Chippewa Drive	224	205	251	2,777
1st Avenue east of State Street	258	N/A	384	3,253
Commerce Parkway between Bergman and Warren Street	384	412	450	5,211
County Highway I between Scheidler Road an d WI-178	484	455	571	5,643
WI-178 between County Highway I and Chippewa River	704	604	783	8,283

a) Traffic count for the hour between 00:00 and 09:59 hours with the greatest traffic volume.
b) Traffic count for the hour between 10:00 and 14:59 hours with the greatest traffic volume.
c) Traffic count for the hour between 15:00 and 23:59 hours with the greatest traffic volume.

Table 19.5.2-6 Minority and Poverty Populations within a 5-Mile (8-Km) Radius of the Chippewa Falls Site [(a)] (Sheet 1 of 2)

		Minority Population (%)							
Block Group and Tract	Households Living Below Poverty Level	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander alone	Some Other Race alone	Two or More Races	Hispanic or Latino	Aggregate
Block Group 1, Census Tract 102	12.4%	0.5%	0.6%	1.3%	0.0%	0.1%	0.5%	1.3%	4.3%
Block Group 2, Census Tract 102	2.1%	0.6%	0.3%	2.6%	0.0%	0.1%	1.0%	2.4%	7.0%
Block Group 3, Census Tract 102	8.8%	0.4%	0.6%	0.8%	0.0%	0.1%	1.2%	1.7%	4.7%
Block Group 1, Census Tract 103	36.5%	1.6%	0.5%	0.1%	0.0%	0.0%	1.4%	2.2%	5.9%
Block Group 2, Census Tract 103	14.5%	0.0%	0.6%	0.1%	0.1%	0.3%	1.1%	1.8%	4.0%
Block Group 3, Census Tract 103	10.4%	0.7%	0.5%	0.5%	0.0%	0.0%	1.1%	0.5%	3.3%
Block Group 4, Census Tract 103	25.0%	0.6%	0.7%	0.1%	0.0%	0.0%	1.0%	1.4%	3.8%
Block Group 5, Census Tract 103	3.1%	0.3%	0.3%	1.1%	0.0%	0.0%	0.9%	1.1%	3.7%
Block Group 6, Census Tract 103	6.0%	0.1%	0.2%	2.0%	0.0%	0.0%	0.7%	2.6%	5.6%
Block Group 1, Census Tract 104	7.0%	0.1%	0.3%	0.4%	0.0%	0.0%	0.4%	0.9%	2.2%
Block Group 3, Census Tract 104	1.0%	0.4%	0.4%	4.2%	0.0%	0.0%	0.1%	0.7%	5.9%
Block Group 1, Census Tract 105	8.4%	0.9%	0.0%	0.5%	0.0%	0.0%	0.6%	1.8%	3.9%
Block Group 2, Census Tract 105	18.3%	1.2%	0.1%	1.3%	0.1%	0.0%	2.0%	1.0%	5.7%
Block Group 3, Census Tract 105	7.0%	0.6%	1.2%	0.6%	0.0%	0.0%	2.4%	0.7%	5.4%
Block Group 4, Census Tract 105	16.5%	6.4%	1.5%	1.1%	0.0%	0.0%	1.2%	2.2%	12.4%
Block Group 1, Census Tract 107	5.9%	0.4%	0.4%	0.0%	0.0%	0.0%	1.0%	0.7%	2.6%
Block Group 2, Census Tract 107	6.5%	0.3%	0.1%	0.7%	0.0%	0.0%	0.8%	0.8%	2.8%
Block Group 3, Census Tract 107	13.7%	0.5%	0.4%	1.0%	0.0%	0.0%	1.2%	1.1%	4.2%
Block Group 3, Census Tract 108	1.0%	0.1%	1.1%	0.9%	0.0%	0.0%	1.0%	0.4%	3.5%
Block Group 4, Census Tract 110	2.3%	0.1%	0.1%	0.4%	0.0%	0.0%	0.9%	0.5%	2.0%
Block Group 5, Census Tract 110	5.4%	0.6%	0.1%	0.3%	0.0%	0.1%	1.1%	0.4%	2.6%
Block Group 4, Census Tract 112	1.9%	0.1%	0.0%	0.2%	0.0%	0.0%	0.2%	0.5%	1.0%

Table 19.5.2-6 Minority and Poverty Populations within a 5-Mile (8-Km) Radius of the Chippewa Falls Site [(a)] (Sheet 2 of 2)

		Minority Population (%)							
Block Group and Tract	**Households Living Below Poverty Level**	**Black or African American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander alone**	**Some Other Race alone**	**Two or More Races**	**Hispanic or Latino**	**Aggregate**
Total Area, 5 Mi. Radius	9.5%	0.9%	0.5%	1.0%	0.0%	0.0%	1.0%	1.2%	4.6%
Chippewa County	10.9%	1.5%	0.4%	1.2%	0.0%	0.0%	0.9%	1.3%	5.4%
State of Wisconsin	11.2%	6.2%	0.9%	2.3%	0.0%	0.1%	1.4%	5.9%	16.7%

a) Shaded cells indicate "Above Average Populations" (USCB, 2012c).

Table 19.5.2-7 Potentially Significant Projects Identified within a 5-Mile (8-Km) Radius of the Cippewa Falls Site Vicinity (Sheet 1 of 2)

Project/Company Name	Summary of Project	Location	Distance from Site	Status	Reference
EOG Resources Inc.	Silica sand processing plant.	Chippewa Falls	1 mi. (1.6 km)	Operating, achieved full operation in May 2012.	The Chippewa Herald, 2012 EOG Resources, 2012
Wissota Green Housing Development	Building of a traditional neighborhood, complete with neighborhood parks and a home owners association park with access to Lake Wissota. (100 lots, with varying lot sizes).	Chippewa Falls	1 mi. (1.6 km)	Conditional Use Permit approved in 2005; developer went bankrupt in 2009; land scheduled to be sold to continue development individually.	The Chippewa Herald, 2009
CN Railway Intermodal Train-Truck Project	Rail to truck transfer facility; future expansion that will allow an estimated 400 trucks per week.	Chippewa Falls	2 mi. (3.2 km)	Operating, with plans for expansion.	Rubenzer, 2011
Chippewa Falls Irvine Park and Zoo	Updates to current exhibits. Next step is to design the primate/small animal building and visitor/artifact center.	Chippewa Falls	2 mi. (3.2 km)	Approved by Chippewa Falls Park Board in December 2011; progress will not occur until fundraising completed.	Vetter, 2012
Indianhead Plating, Inc.	Construction of a hard chrome plating tank.	Chippewa Falls	2 mi. (3.2 km)	Applied for air construction permit in December 2011, waiting for approval.	WDNR, 2012c
Spectrum Industries	Construction of burn off oven for paint hangers.	Chippewa Falls	2 mi. (3.2 km)	Air construction permit issued in February 2011.	WDNR, 2012d
Great Northern Corporation	Construction of printers.	Chippewa Falls	2 mi. (3.2 km)	Air construction permit issued in March 2011.	WDNR, 2012e
Dairyland Power Cooperative -Seven Mile Creek Landfill Gas to Renewable Energy Station	Modifications to an existing internal combustion engine and existing landfill gas to energy generating facility.	Eau Claire	2 mi. (3.2 km)	Air construction permit issued in March 2011.	WDNR, 2012f

Table 19.5.2-7 Potentially Significant Projects Identified within a 5-Mile (8-Km) Radius of the Cippewa Falls Site Vicinity (Sheet 2 of 2)

Project/Company Name	Summary of Project	Location	Distance from Site	Status	Reference
WRR Environmental Services Company, Inc.	Construction of tanks Q and R and modifications to the F-V (Full - Vacuum) Fractionation Distillation Column.	Eau Claire	4 mi. (6.4 km)	Air construction permit issued in February 2011.	WDNR, 2012g
Wheaton Generating Station (430 MW maximum, fuel oil)	Operating power plant with potential air pollution control projects for compliance with future regulatory requirements.	Chippewa County	5 mi. (8.0 km)	Operating, with possible addition of air pollution control equipment in the future.	ThinkResources, Inc. 2008
Elk Mound Generating Station (71 MW, Combustion Turbines)	Operating power plant with potential air pollution control projects for compliance with future regulatory requirements.	Chippewa County	5 mi. (8.0 km)	Operating, with possible addition of air pollution control equipment in the future.	McCarthy, 2011 USEPA, 2012c
EDI Aftermarket Services Facility	Additional facility with new machining/ grinding capabilities for flat die rework.	Chippewa Falls	5 mi. (8.0 km)	Scheduled to finish by October 2012.	EDI, 2011

Table 19.5.2-8 Sensitive Features in the Stevens Point Site Area

	Measured from Site Nearest Boundary	Measured from Center Point
Nearest Residence 1	0.20 mi. (0.33 km)	0.39 mi. (0.63 km)
Nearest Residence 2	0.21 mi. (0.34 km)	0.41 mi. (0.65 km)
Little Scholars Child Center and Preschool	0.60 mi. (0.97 km)	0.83 mi. (1.34 km)
Children's Discovery Center (day care)	0.66 mi. (1.06 km)	0.85 mi. (1.37 km)
Stockton School (potential historical site)	0.69 mi. (1.12 km)	0.92 mi. (1.48 km)
Conifer Park (city park)	0.78 mi. (1.26 km)	1.03 mi. (1.67 km)
Little Scholars Beginnings (day care)	0.74 mi. (1.19 km)	0.93 mi. (1.50 km)
Medical Office Building	0.89 mi. (1.43 km)	1.11 mi. (1.79 km)
Unnamed Cemetery (potential historical site)	0.85 mi. (1.37 km)	1.10 mi. (1.78 km)
Oakview Dental Center	0.83 mi. (1.34 km)	1.04 mi. (1.68 km)
Aspirus Stevens Point Medical Clinic	0.98 mi. (1.58 km)	1.21 mi. (1.95 km)
Bannach Elementary School (nearest public school)	1.53 mi. (2.46 km)	1.86 mi. (2.99 km)
Saint Michael's Hospital (nearest hospital)	3.54 mi. (5.69 km)	3.77 mi. (6.07 km)
Nelson Hall (nearest listed historical site)	3.54 mi. (5.69 km)	3.74 mi. (6.01 km)

Table 19.5.2-9 Potential Land Use and Natural Habitat Impacts at the Stevens Point Site (USGS, 2006)

Land Use Category	Permanently Developed Area	Temporarily Disturbed Area	Remaining Area within Site Boundaries	Total Within Site Boundaries	Total Within 5-Mile Radius	Percentage of 5-Mile Radius within Site Boundaries
Developed land	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	13,555.3 ac. (5,485.6 ha)	0.0%
Cultivated Crops	3.6 ac. (1.4 ha)	13.6 ac. (5.5 ha)	13.4 ac. (5.4 ha)	30.6 ac. (12.4 ha)	18,062.4 ac. (7,309.6 ha)	0.17%
Pasture/Hay	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	3,616.6 ac. (1,463.6 ha)	0.0%
Grassland/Herbaceous	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	262.9 ac. (106.4 ha)	0.0%
Shrub/Scrub	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	50.8 ac. (20.6 ha)	0.0%
Deciduous Forest	13.9 ac. (5.6 ha)	0 ac. (0 ha)	34.3 ac. (13.9 ha)	48.2 ac. (19.5 ha)	7,537.7 ac. (3,050.4 ha)	0.64%
Evergreen Forest	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	1,566.5 ac. (633.9 ha)	0.0%
Mixed Forest	0 ac. (0 ha)	0 ac. (0 ha)	1.6 ac. (0.6 ha)	1.6 ac. (0.6 ha)	935.2 ac. (378.4 ha)	0.17%
Woody Wetlands	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	2,627.1 ac. (1,063.2 ha)	0.0%
Emergent, Herbaceous Wetlands	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	814.9 ac. (329.8 ha)	0.0%
Open Water	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	1,126.8 ac. (456.0 ha)	0.0%
Barren Land (Rock/ Sand/Clay)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	0 ac. (0 ha)	108.5 ac. (43.9 ha)	0.0%
Totals	17.4 ac. (7.1 ha)	13.6 ac. (5.5 ha)	49.3 ac. (20.0 ha)	80.4 ac. (32.5 ha)	50,264.9 ac. (20,341.5 ha)	0.16%

Table 19.5.2-10 Plant Species Observed at the Stevens Point Site (Sheet 1 of 2)

Site Locale	Scientific Name	Common Name
Forested Area	*Abies balsamea*	balsam fir
	Acer saccharum	sugar maple
	Carex sp.	sedge
	Ostrya virginiana	hop hornbeam
	Pinus strobus	white pine
	Pinus sylvestris	scotch pine
	Prunus serotina	black cherry
	Quercus alba	white oak
	Quercus macrocarpa	bur oak
	Quercus rubra	red oak
	Quercus species	other oak species
	Ribes sp.	gooseberry
	Rubus sp.	blackberry
	Smilax sp.	green briar
	Tilia americana	American basswood
	Viburnum sp.	viburnum

Table 19.5.2-10 Plant Species Observed at the Stevens Point Site (Sheet 2 of 2)

Site Locale	Scientific Name	Common Name
Cultivated Field Edges	*Ambrosia artemisiifolia*	common ragweed
	Amorpha canescens	leadplant
	Bromus inermis	smooth brome
	Conyza canadensis	horseweed
	Euthamia graminifolia	flattop goldenrod
	Panicum sp.	panic grass
	Potentilla quinquefolia	creeping cinquefoil
	Rubus flagellarus	dewberry
	Setaria glauca	foxtail grass
	Solidago sp.	goldenrod
	Symphyotrichum sp.	aster

Table 19.5.2-11 Endangered Resources Known or Likely to Occur in the Stevens Point Site Area [a]

	Scientific Name	Common Name	State Status	Global Rank [b]	State Rank [c]
Mammals	*Microtus ochrogaster*	prairie vole	Special Concern (No regulations) [d]	G5	S2
Plants	*Asclepias lanuginose*	woolly milkweed	Threatened [e]	G4	S1
	Arabis missouriensis	Missouri rock-cress	Special Concern [d]	G5	S2
Reptiles	*Glyptemys insculpta*	wood turtle	Threatened [e]	G4	S2

a) Species designated by the WDNR in Endangered Resources Review (WDNR, 2011b).
b) Global ranking system ranging from G1: critically imperiled globally to G5: common, widespread, and abundant according to the Wisconsin Natural Heritage Working List.
c) State ranking system ranging from S1: critically imperiled in Wisconsin to S5: demonstrably secure in Wisconsin according to the Wisconsin Natural Heritage Working List.
d) Classification signifying an issue with abundance or distribution to increase awareness before species becomes threatened or endangered. Species not legally protected by state or federal endangered species laws, but may be protected by other laws, policies, or permitting processes requiring or strongly encouraging protection of these resources.
e) The term "threatened" is defined in the Endangered Species Act as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range".

Table 19.5.2-12 Annual Average Hourly Traffic Counts in the Stevens Point Site Area (Sheet 1 of 2)

	Annual Average Hourly Traffic (WDOT, 2011)			
	AM Peak [(a)]	**Midday Peak [(b)]**	**PM Peak [(c)]**	**Daily Total**
I-39 southbound off-ramp from US-10	372	496	641	6,898
I-39 southbound on-ramp from US-10	315	437	497	5,710
I-39 northbound off-ramp from US-10	304	188	187	2,787
I-39 northbound on-ramp from US-10	774	627	611	8,734
US-10 between I-39 and Maple Bluff	1,895	2,823	2,549	32,681
County Highway R north of US-10	189	261	295	3,440
County Highway R south of US-10	396	603	704	7,962
I-39 between US-10 and County Highway HH	1,422	1,407	1,770	22,086
Old Highway 18 west of Burbank Road [(d)]	18	19	29	281
Old Highway 18 between Burbank and Stockton Road [(d)]	22	28	45	390
Burbank Road south of Old Highway 18 [(d)]	15	18	30	260

Table 19.5.2-12 Annual Average Hourly Traffic Counts in the Stevens Point Site Area (Sheet 2 of 2)

	Annual Average Hourly Traffic (WDOT, 2011)			
	AM Peak [a]	**Midday Peak [b]**	**PM Peak [c]**	**Daily Total**
I-39 southbound off-ramp to County Highway HH	171	248	320	3,383
I-39 southbound on-ramp from County Highway HH	107	186	225	2,302
I-39 northbound off-ramp to County Highway HH	169	217	231	2,888
I-39 northbound on-ramp from County Highway HH	226	218	255	3,272
County Highway HH between I-39 and County Highway R	351	426	522	6,125
County Highway R north of Porter Road [e]	413	N/A	723	6,565

a) Traffic count for the hour between 00:00 and 09:59 hours with the greatest traffic volume.
b) Traffic count for the hour between 10:00 and 14:59 hours with the greatest traffic volume.
c) Traffic count for the hour between 15:00 and 23:59 hours with the greatest traffic volume.
d) Annual average hourly traffic counts from 2009.
e) Annual average hourly traffic counts from 2010.

Table 19.5.2-13 Minority and Poverty Populations within a 5-Mile (8-Km) Radius of the Stevens Point Site [(a)] (Sheet 1 of 2)

		Minority Population (%)							
Block Group and Tract	Households Living Below Poverty Level	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander alone	Some Other Race alone	Two or More Races	Hispanic or Latino	Aggregate
Block Group 3, Census Tract 9601	5.6%	0.0%	0.4%	0.0%	0.0%	0.0%	0.6%	2.0%	3.0%
Block Group 4, Census Tract 9602	5.3%	0.1%	0.2%	0.1%	0.0%	0.0%	0.4%	0.4%	1.1%
Block Group 1, Census Tract 9603	39.2%	0.9%	0.1%	5.0%	0.0%	0.1%	0.9%	1.6%	8.8%
Block Group 2, Census Tract 9603	18.1%	0.9%	0.1%	16.8%	0.1%	0.1%	1.3%	2.8%	22.1%
Block Group 3, Census Tract 9603	36.4%	1.4%	0.8%	4.7%	0.1%	0.2%	2.0%	3.3%	12.7%
Block Group 4, Census Tract 9603	48.7%	0.3%	0.8%	6.9%	0.0%	0.2%	0.9%	2.4%	11.6%
Block Group 1, Census Tract 9604	59.5%	0.7%	0.5%	2.2%	0.2%	0.0%	1.6%	2.3%	7.4%
Block Group 2, Census Tract 9604	18.0%	0.7%	0.0%	3.7%	0.0%	0.0%	0.6%	4.0%	9.1%
Block Group 3, Census Tract 9604	28.9%	1.6%	0.3%	5.8%	0.0%	0.0%	0.7%	2.9%	11.3%
Block Group 4, Census Tract 9604	14.8%	0.0%	0.7%	3.0%	0.0%	0.0%	0.8%	1.6%	6.1%
Block Group 5, Census Tract 9604	16.1%	1.4%	0.5%	3.6%	0.2%	0.1%	1.5%	2.3%	9.5%
Block Group 1, Census Tract 9605	0.0%	0.0%	0.1%	2.4%	0.0%	0.0%	1.0%	1.4%	5.0%
Block Group 2, Census Tract 9605	5.8%	0.3%	0.3%	1.3%	0.0%	0.0%	0.4%	0.8%	3.1%
Block Group 3, Census Tract 9605	11.0%	0.3%	0.6%	0.9%	0.0%	0.0%	0.9%	5.7%	8.5%
Block Group 4, Census Tract 9605	1.4%	0.5%	0.5%	2.8%	0.0%	0.1%	0.6%	1.5%	6.0%
Block Group 1, Census Tract 9606	2.3%	0.1%	0.2%	0.7%	0.0%	0.0%	0.4%	1.3%	2.7%
Block Group 4, Census Tract 9606	2.5%	0.3%	0.1%	0.4%	0.0%	0.4%	1.0%	0.9%	3.1%
Block Group 1, Census Tract 9607.01	11.7%	0.5%	0.3%	4.2%	0.0%	0.1%	1.5%	6.0%	12.5%
Block Group 2, Census Tract 9607.01	2.6%	0.3%	0.2%	2.8%	0.0%	0.0%	0.8%	1.4%	5.5%
Block Group 3, Census Tract 9607.01	7.5%	0.3%	0.2%	2.7%	0.0%	0.1%	1.1%	2.3%	6.7%
Block Group 1, Census Tract 9607.02	5.3%	0.8%	0.2%	4.4%	0.1%	0.0%	1.1%	1.8%	8.4%
Block Group 2, Census Tract 9607.02	1.7%	0.4%	0.0%	3.4%	0.0%	0.1%	0.5%	1.6%	6.0%

Table 19.5.2-13 Minority and Poverty Populations within a 5-Mile (8-Km) Radius of the Stevens Point Site [(a)] (Sheet 2 of 2)

		Minority Population (%)							
Block Group and Tract	**Households Living Below Poverty Level**	**Black or African American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander alone**	**Some Other Race alone**	**Two or More Races**	**Hispanic or Latino**	**Aggregate**
Block Group 1, Census Tract 9608	6.5%	0.6%	0.0%	2.8%	0.0%	0.0%	0.9%	2.0%	6.3%
Block Group 2, Census Tract 9608	24.5%	1.3%	0.4%	5.9%	0.0%	0.5%	1.7%	2.4%	12.3%
Block Group 3, Census Tract 9608	19.3%	1.4%	0.3%	4.8%	0.0%	0.0%	1.3%	1.0%	8.7%
Block Group 4, Census Tract 9608	10.8%	0.9%	0.2%	5.1%	0.0%	0.0%	3.0%	3.0%	12.4%
Block Group 1, Census Tract 9609	9.9%	1.3%	0.5%	3.4%	0.0%	0.0%	1.0%	2.9%	9.1%
Block Group 2, Census Tract 9609	19.1%	0.4%	0.5%	2.6%	0.0%	0.0%	1.8%	2.6%	7.8%
Block Group 3, Census Tract 9609	24.8%	0.2%	0.0%	4.2%	0.0%	0.0%	2.1%	3.5%	10.0%
Block Group 4, Census Tract 9609	9.6%	1.4%	0.5%	3.3%	0.0%	0.0%	2.0%	4.2%	11.4%
Block Group 1, Census Tract 9610	38.1%	0.9%	0.3%	2.0%	0.1%	0.0%	1.2%	3.3%	7.7%
Block Group 2, Census Tract 9610	25.8%	1.9%	0.2%	2.2%	0.1%	0.0%	0.9%	2.1%	7.4%
Block Group 1, Census Tract 9611	3.0%	0.2%	0.1%	3.9%	0.1%	0.0%	1.2%	2.6%	8.1%
Block Group 2, Census Tract 9611	15.0%	0.0%	0.4%	0.4%	0.0%	0.0%	1.1%	2.2%	4.1%
Block Group 3, Census Tract 9611	10.9%	0.5%	0.5%	6.3%	0.1%	0.1%	0.8%	2.5%	10.7%
Block Group 4, Census Tract 9611	14.9%	0.2%	0.2%	0.6%	0.0%	0.0%	1.3%	2.1%	4.4%
Block Group 2, Census Tract 9612	4.2%	0.4%	0.3%	3.7%	0.0%	0.0%	1.0%	5.1%	10.6%
Block Group 3, Census Tract 9612	15.6%	0.7%	0.5%	5.3%	0.0%	0.0%	1.1%	4.6%	12.2%
Total Area, 5 Mi. Radius	13.6%	0.6%	0.3%	3.5%	0.0%	0.1%	1.1%	2.5%	8.1%
Portage County	12.4%	0.5%	0.3%	2.8%	0.0%	0.0%	1.0%	2.6%	7.3%
State of Wisconsin	11.2%	6.2%	0.9%	2.3%	0.0%	0.1%	1.4%	5.9%	16.7%

a) Shaded cells indicate "Above Average Populations" (USCB, 2012c)

Table 19.5.2-14 Potentially Significant Projects Identified within a 5-Mile (8-Km) Radius of the Stevens Point Site Vicinity (Sheet 1 of 2)

Project/Company Name	Summary of Project	Location	Distance from Site	Status	Reference
Central Wisconsin Alcohol, Inc.	Construction of an ethanol plant based on whey fermentation.	Plover	1 mi. (1.6 km)	Air construction permit denied by the state March 20, 2012.	WDNR, 2012h
NAPA Distribution Center	Replacing current parking lot with a new lot with 105 stalls. Also planning a 25,000 sq. ft. addition to distribution center.	Stevens Point	1 mi. (1.6 km)	Plans approved in January 2012.	City of Stevens Point, 2012a
Donaldson Company Inc.	Modifications to equipment configurations at existing filter manufacturing facility.	Stevens Point	1 mi. (1.6 km)	Air construction permit issued in Oct. 2011, expires June 2013.	WDNR, 2012i
Municipal Transit Center	Development of a 35,070 sq. ft vacant lot for a parking lot with 57 parking spaces.	Stevens Point	1 mi. (1.6 km)	Plans approved in January 2012.	City of Stevens Point, 2012a
Focus on Energy Methane/ Natural Gas-Fueled Electric Generator	New generator to be installed at existing Wastewater Treatment Facility; will burn digester gas (methane) produced there.	Stevens Point	3 mi. (4.8 km)	Received funding in July 2012.	City of Stevens Point, 2012b
Columbia Energy Center (455 MW baseload, coal fired)	Operating power plant with potential air pollution control projects for compliance with future regulatory requirements.	Portage	3 mi. (4.8 km)	Operating, with possible addition of air pollution control equipment in the future.	Jerde, 2011
Copps Food Center	Construction of a 70,000 sq. ft. store with 385 stall parking lot.	Stevens Point	3 mi. (4.8 km)	Plans approved in January 2012.	City of Stevens Point, 2012a

Table 19.5.2-14 Potentially Significant Projects Identified within a 5-Mile (8-Km) Radius of the Stevens Point Site Vicinity (Sheet 2 of 2)

Project/Company Name	Summary of Project	Location	Distance from Site	Status	Reference
Schmeeckle Trails Housing Development	Expansion of existing residential development.	Stevens Point	3.5 mi. (5.6 km)	Beginning second phase of building “essential houses” in the development.	iMakeSense, LLC, 2010
WIMME Sand & Gravel	Sand and gravel plant.	Plover (Portage County)	5 mi. (8.0 km)	Operating.	WDNR, 2012j
U.S. Highway 10 Expansion Project	New four lane highway that will bypass downtown Stevens Point.	Stevens Point	5 mi. (8.0 km)	Construction started in 2006, scheduled for completion in 2012.	WDOT, 2012
Water and Sewer Reconstruction Project	Michigan Avenue and Fourth Avenue mains to be reconstructed.	Stevens Point	4 mi. (6.4 km) 5 mi. (8.0 km)	Scheduled to be completed in 2012.	City of Stevens Point, 2012c
Lake Dredging (several locations)	Several areas are to be dredged and fill material hauled off-site.	McDill Lake District (Portage County)	5 mi. (8.0 km)	Scheduled to start in 2012.	City of Stevens Point, 2011b
Neenah Paper Inc. Whiting Mill Biomass Plant (wood and waste fibers to steam)	Operating power plant with potential air pollution control projects for compliance with future regulatory requirements.	Stevens Point	5 mi. (8.0 km)	Operating, with possible addition of air pollution control equipment in the future.	Environmental Leader, LLC, 2008

19.5.3 COST-BENEFIT OF THE ALTERNATIVES

This section discusses the costs and benefits of each reasonable alternative and the proposed action, including a qualitative discussion of environmental impacts and identification of any assumptions and uncertainties. The following information on costs and benefits is provided:

- Qualitative discussion of environmental degradation (including impacts to air and water quality; biotic resources; aesthetic resources; socioeconomic impacts, such as noise, traffic congestion, and increased demand for public services; and land use changes).
- Qualitative discussion of effects on public health and safety.
- Other costs (including lost tax revenue, decreased recreational value, and transportation, as appropriate).
- Qualitative discussion of environmental benefits (comparable to the discussion of environmental degradation).
- Average annual production of commercial products.
- Expected increase in tax payments to state and local tax jurisdictions during (1) the construction period and (2) facility operations.
- Creation and improvement of transportation infrastructure and other facilities.
- Other benefits.

The following types of alternatives are discussed:

- Alternative sites
- Alternative technologies

19.5.3.1 ALTERNATIVE SITES

This subsection discusses the costs and benefits of the proposed site (Janesville) and the two alternative sites (Chippewa Falls and Stevens Point). For this evaluation, the SHINE facility design, described in Section 19.2, and the construction and operation practices, described in Section 19.4, are assumed to be the same for each site. This assumption allows for a comprehensive and consistent comparison of costs and benefits.

19.5.3.1.1 Janesville (Proposed) Site

19.5.3.1.1.1 Environmental Degredation

The environmental impacts expected to result from construction and operation of the SHINE facility at the Janesville site are summarized below.

<u>Air Quality</u>

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of nitrogen oxides (NO_x), particulate matter (PM), and sulfur dioxide (SO_2). Preliminary modeling indicates that the air quality impacts of these criteria pollutants are minimal and do not approach ambient air quality standards. However, the Significant Impact Level for 1-hour NO_x may be exceeded, requiring more detailed modeling for state air pollution permitting.

Water Quality

- Facility construction results in some discharge of suspended solids to local drainage ditch systems. Very small probability of affecting identified water resources due to low surface runoff potential and distance from the nearest surface water body (approximately 1.6 mi. [2.6 km]).
- Construction activities will not reach groundwater. Dewatering of groundwater is not anticipated.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.
- Facility operation requires discharge of wastewater to the City of Janesville sanitary sewer system, which has adequate capacity.
- Facility operation requires water withdrawal from the City of Janesville water supply system, which has adequate capacity.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agriculture lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.
- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out-of-character with the site setting.
- During facility operation, the existing agricultural landscape is permanently altered, but the facility appearance is consistent with light industrial uses associated with the Southern Wisconsin Regional Airport.
- During both construction and operation, aesthetic impacts are limited by the presence of relatively few sensitive receptors in close proximity.

Socioeconomics

- Facility construction results in some temporary increases in noise, due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.

- During both construction and operation, noise impacts are limited by the presence of relatively few sensitive receptors in close proximity.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.
- During both construction and operation, traffic impacts are limited by the capacity and good condition of the existing roads that serve the site area.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.
- During both construction and operation, socioeconomic impacts are limited because most workers are expected to reside in Rock County (not relocate to the area) and because the housing market, public education resources, etc., generally have excess capacity.

Land Use

- Facility construction results in the permanent conversion of approximately 26 acres (ac.) (10.5 hectare [ha]) of agricultural lands to industrial land use, and the temporary conversion of approximately 14 ac. (5.7 ha) of agricultural lands to industrial land use.
- All of the land permanently or temporarily converted to industrial land use is classified as Prime Farmland or Farmland of Statewide Importance.
- Facility operation does not result in additional on-site land use impacts.
- No off-site land use impacts are expected during construction or operation except for minor construction of housing to serve facility workers who move into the site area.

19.5.3.1.1.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety may result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts are expected to be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety may result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public is exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials are strictly controlled, and all radiological doses comply with regulatory limits.

19.5.3.1.1.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project is not expected to result in any transportation impacts except for the minor traffic impacts on local roads discussed in Subsection 19.5.3.1.1.1.

19.5.3.1.1.4 Environmental Benefits

Facility construction is expected to create approximately 420 construction jobs during the peak of construction activities. Facility operation is expected to create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified.

In addition to economic benefits, the project also will benefit the health of people who need diagnostic tests that require technetium-99m (Tc-99m) and other isotopes. The facility is expected to satisfy approximately half of the annual demand for Tc-99m in the United States, and to provide a more reliable supply of this isotope than currently exists. This represents a significant health benefit. The facility will also produce I-131 and Xe-133, which will have additional health benefits.

19.5.3.1.1.5 Production of Commercial Products

The facility has the capacity to produce an average of approximately 156,000 6-day Ci of Mo-99 per year. This translates to millions of doses of Tc-99m per year for diagnostic tests.

In addition, the facility is expected to produce an average of approximately 100,000 Ci of I-131 and 100,000 Ci of Xe-133 per year.

19.5.3.1.1.6 Increase in Tax Payments

The facility is expected to pay property taxes of approximately $635,000 per year during construction and approximately $660,000 per year during operation (after expiration of an initial 10-year TIF agreement), representing an increase of approximately 0.30 percent in the annual property tax revenues of Rock County.

19.5.3.1.1.7 Creation and Improvement of Infrastructure

No creation or improvement of infrastructure is expected to result directly from the project. The City of Janesville plans to install a water main and a sewer main along the northern boundary of the site, but the project is not dependent on this construction.

19.5.3.1.1.8 Other Benefits

No other significant benefits have been identified.

19.5.3.1.2 Chippewa Falls Site

19.5.3.1.2.1 Environmental Degredation

The environmental impacts that would be expected to result from construction and operation of the SHINE facility at the Chippewa Falls site are summarized below.

Air Quality

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of NO_x, PM, and SO_2. Although air quality modeling has not been performed at the Chippewa Falls site, it is expected that air quality impacts would be similar to those modeled at the Janesville site, meaning that pollutant concentrations would not approach ambient air quality standards but may exceed the Significant Impact Level for 1-hour NO_x, requiring more detailed modeling for state air pollution permitting.

Water Quality

- Facility construction results in some discharge of suspended solids to local drainage ditch systems. Very small probability of affecting identified water resources due to low surface runoff potential and distance from the nearest surface water body (0.75 mi. [1.2 km]).
- Construction activities will not reach groundwater. Dewatering of groundwater is not anticipated.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.
- Facility operation results in discharge of wastewater to City of Chippewa Falls sanitary sewer system, which has adequate capacity.
- Facility operation requires water withdrawal from City of Chippewa Falls water supply system, which has adequate capacity.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agricultural lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.
- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out of character with the site setting.
- During facility operation, the existing agricultural landscape is permanently altered, but the facility appearance is generally consistent with nearby commercial land uses.
- During facility construction, aesthetic impacts may result in complaints from the public about a changed sense of place or a diminution in enjoyment of the physical environment, due to the presence of several sensitive receptors in close proximity to the site.

Socioeconomics

- Facility construction results in some temporary increases in noise, due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.
- During facility construction, noise impacts may result in complaints from the public due to the presence of several sensitive receptors in close proximity to the site.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.
- During facility construction, project-related traffic may noticeably alter transportation conditions on local roads, due to the condition of the existing roads that serve the site area.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.
- During both construction and operation, socioeconomic impacts are limited because most workers are expected to reside in Chippewa County (not relocate to the area) and because the housing market, public education resources, etc., generally have excess capacity.

Land Use

- Facility construction results in the permanent conversion of approximately 15 ac. (6.1 ha) of agricultural lands and 3 ac. (1.2 ha) of fallow lands to industrial land use, and the temporary conversion of approximately 14 ac. (5.7 ha) of agricultural lands to industrial land use.

- Almost all of the land permanently or temporarily converted to industrial land use is classified as Prime Farmland or Farmland of Statewide Importance.
- Facility operation does not result in additional on-site land use impacts.
- No off-site land use impacts are expected during construction or operation except for minor construction of housing to serve facility workers who move into the site area.

19.5.3.1.2.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts would be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public would be exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials would be strictly controlled, and all radiological doses would comply with regulatory limits.

19.5.3.1.2.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project would not be expected to result in any transportation impacts except for the traffic impacts on local roads discussed in Subsection 19.5.3.1.2.1.

19.5.3.1.2.4 Environmental Benefits

Facility construction is expected to create approximately 420 construction jobs during the peak of construction activities. Facility operation is expected to create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified.

In addition to economic benefits, the project also would benefit the health of people who need diagnostic tests that require Tc-99m and other isotopes. The facility is expected to satisfy approximately half of the annual demand for Tc-99m in the United States, and to provide a more reliable supply of this isotope than currently exists. This represents a significant health benefit. The facility will also produce I-131 and Xe-133, which will have additional health benefits.

19.5.3.1.2.5 Production of Commercial Products

The facility has the capacity to produce an average of approximately 156,000 6-day Ci of Mo-99 per year. This translates to millions of doses of Tc-99m per year for diagnostic tests.

In addition, the facility is expected to produce an average of approximately 100,000 Ci of I-131 and 100,000 Ci of Xe-133 per year.

19.5.3.1.2.6 Increase in Tax Payments

The facility would be expected to pay approximately the same amount of property taxes at the Chippewa Falls site as at the Janesville site. This means that the facility would pay approximately $635,000 per year during construction and approximately $660,000 per year during operation, representing an increase of approximately 4.4 percent in the annual property tax revenues of Chippewa County.

19.5.3.1.2.7 Creation and Improvement of Infrastructure

No creation or improvement of infrastructure is expected to result directly from the project. However, improvements such as widening or adding turning lanes to existing roads near the project site might be necessary to alleviate traffic congestion during construction.

19.5.3.1.2.8 Other Benefits

No other significant benefits have been identified.

19.5.3.1.3 Stevens Point Site

19.5.3.1.3.1 Environmental Degredation

The environmental impacts that would be expected to result from construction and operation of the SHINE facility at the Stevens Point site are summarized below.

<u>Air Quality</u>

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of NO_x, PM, and SO_2. Although air quality modeling has not been performed at the Stevens Point site, it is expected that air quality impacts would be similar to those modeled at the Janesville site, meaning that pollutant concentrations would not approach ambient air quality standards but may exceed the Significant Impact Level for 1-hour NO_x, requiring more detailed modeling for state air pollution permitting.

<u>Water Quality</u>

- Facility construction results in some discharge of suspended solids to local drainage ditch systems. Very small probability of affecting identified water resources due to low surface runoff potential and distance from the nearest surface water body (2.0 mi. [3.2 km]).
- Construction activities will likely reach groundwater. Soil borings drilled on-site encountered groundwater at a depth of 8 to 11 ft. (2.4 to 3.4 m), and groundwater was observed inside water wells between the depths of 7 and 20 ft. (2.1 and 6.1 m). Dewatering of groundwater is anticipated during construction.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.

- Facility operation results in discharge of wastewater to the City of Stevens Point sanitary sewer system, which has adequate capacity.
- Facility operation requires water withdrawal from the City of Stevens Point water supply system, which has adequate capacity.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agricultural lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Facility construction results in clearing of on-site woodlot (partial or complete) and some displacement of fauna, particularly birds and mammals that inhabit the woodlot.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.
- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out-of-character with the site setting.
- During facility operation, the existing agricultural landscape and woodlot is permanently altered, but the facility appearance may be consistent with the City of Stevens Point's plan to develop the area as a business park.
- During facility construction, aesthetic impacts may result in complaints from the public about a changed sense of place or a diminution in enjoyment of the physical environment, due to the presence of several sensitive receptors in close proximity to the site.

Socioeconomics

- Facility construction results in some temporary increases in noise due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.
- During facility construction, noise impacts may result in complaints from the public due to the presence of several sensitive receptors in close proximity to the site.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.

- During facility construction, project-related traffic may noticeably alter transportation conditions on local roads, due to the condition of the existing roads that serve the site area.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.
- During both construction and operation, socioeconomic impacts are limited because most workers are expected to reside in Portage County (not relocate to the area) and because the housing market, public education resources, etc., generally have excess capacity.

Land Use

- Facility construction results in the permanent conversion of approximately 3.6 ac. (1.4 ha) of agricultural lands and 13.9 ac. (5.6 ha) of wooded lands to industrial land use, and the temporary conversion of approximately 13.6 ac. (5.5 ha) of agricultural lands to industrial land use.
- Almost all of the land permanently or temporarily converted to industrial land use is classified as Prime Farmland or Farmland of Statewide Importance.
- Facility operation does not result in additional on-site land use impacts.
- Off-site land use impacts expected are construction of two public streets along the northern and western site boundaries and minor construction of housing to serve facility workers who move into the site area.

19.5.3.1.3.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts would be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public would be exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials would be strictly controlled, and all radiological doses would comply with regulatory limits.

19.5.3.1.3.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project would not be expected to result in any transportation impacts except for the traffic impacts on local roads discussed in Subsection 19.5.3.1.3.1.

19.5.3.1.3.4 Environmental Benefits

Facility construction is expected to create approximately 420 construction jobs during the peak of construction activities. Facility operation is expected to create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified.

In addition to economic benefits, the project also would benefit the health of people who need diagnostic tests that require Tc-99m and other isotopes. The facility is expected to satisfy approximately half of the annual demand for Tc-99m in the United States, and to provide a more reliable supply of this isotope than currently exists. This represents a significant health benefit. The facility will also produce I-131 and Xe-133, which will have additional health benefits.

19.5.3.1.3.5 Production of Commercial Products

The facility has the capacity to produce an average of approximately 156,000 6-day Ci of Mo-99 per year. This translates to millions of doses of Tc-99m per year for diagnostic tests.

In addition, the facility is expected to produce an average of approximately 100,000 Ci of I-131 and 100,000 Ci of Xe-133 per year.

19.5.3.1.3.6 Increase in Tax Payments

The facility would be expected to pay approximately the same amount of taxes at the Stevens Point site as at the Janesville site. This means that the facility would pay approximately $635,000 per year during construction and approximately $660,000 per year during operation, representing an increase of approximately 2.7 percent in the annual property tax revenues of Portage County .

19.5.3.1.3.7 Creation and Improvement of Infrastructure

The City of Stevens Point would be expected to construct public streets along the northern and western site boundaries of the site in connection with the project. Other potential modifications of transportation infrastructure, such as widening or adding turning lanes to existing roads, might be necessary to alleviate traffic congestion during construction.

19.5.3.1.3.8 Other Benefits

No other significant benefits have been identified.

19.5.3.2 ALTERNATIVE TECHNOLOGIES

This subsection discusses the costs and benefits of the proposed SHINE SHINE technology and the two alternative technologies. For this evaluation, the alternative technologies are assumed to be constructed at the proposed Janesville site. This assumption allows for a comprehensive and consistent comparison of costs and benefits.

19.5.3.2.1 SHINE (Proposed) Technology

19.5.3.2.1.1 Environmental Degredation

The environmental impacts expected to result from construction and operation of the SHINE SHINE technology are summarized below.

Air Quality

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of NO_x, PM, and SO_2. These emissions result primarily from natural gas heating of the facility buildings and periodic testing of the emergency diesel generator, plus small amounts of NO_x from the SHINE process.

Water Quality

- Facility construction results in some discharge of suspended solids to local drainage ditch systems.
- Construction activities will not reach groundwater. Dewatering of groundwater is not anticipated.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.
- Facility operation requires water for use in SHINE (target solution and makeup water for the Target Solution Vessel), isotope processing (isotope extraction and purification, uranium extraction, and waste processing), potable water, fire protection, and facility heating and cooling systems. All required water is withdrawn from the City of Janesville water supply system.
- Facility operation requires discharge of wastewater, including sanitary wastes, blowdown from building heating boilers, and liquid wastes from thermal denitration and vent system scrubbers. All wastewater is discharged to the City of Janesville sanitary sewer system and complies with local, state, and federal pre-treatment and wastewater discharge requirements.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agriculture lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.
- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out-of-character with the site setting.
- During facility operation, the existing agricultural landscape is permanently altered, but the facility appearance is consistent with light industrial uses associated with the Southern Wisconsin Regional Airport.

Socioeconomics

- Facility construction results in some temporary increases in noise due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.

Land Use

- Facility construction results in the permanent conversion of approximately 26 ac. (10.5 ha) of agricultural lands to industrial land use, and the temporary conversion of approximately 14 ac. (5.7 ha) of agricultural lands to industrial land use.
- Facility operation does not result in additional on-site land use impacts.
- No off-site land use impacts are expected during construction or operation except for minor construction of housing to serve facility workers who move into the site area.

19.5.3.2.1.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety may result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts are expected to be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety may result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public is exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials are strictly controlled, and all radiological doses comply with regulatory limits.

19.5.3.2.1.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project is not expected to result in any transportation impacts except for the minor traffic impacts on local roads discussed in Subsection 19.5.3.2.1.1.

19.5.3.2.1.4 Environmental Benefits

Facility construction is expected to create approximately 420 construction jobs during the peak of construction activities. Facility operation is expected to create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified .

In addition to economic benefits, the project also will benefit the health of people who need diagnostic tests that require Tc-99m and other isotopes. The facility is expected to satisfy approximately half of the annual demand for Tc-99m in the United States, and to provide a more reliable supply of this isotope than currently exists. This represents a significant health benefit. The facility will also produce I-131 and Xe-133, which will have additional health benefits.

19.5.3.2.1.5 Production of Commercial Products

The facility has the capacity to produce an average of approximately 156,000 6-day Ci of Mo-99 per year. This translates to millions of doses of Tc-99m per year for diagnostic tests.

In addition, the facility is expected to produce an average of approximately 100,000 Ci of I-131 and 100,000 Ci of Xe-133 per year.

19.5.3.2.1.6 Increase in Tax Payments

The facility is expected to pay property taxes of approximately $635,000 per year during construction and approximately $660,000 per year during operation (after expiration of an initial 10-year TIF agreement), representing an increase of approximately 0.30 percent in the annual property tax revenues of Rock County .

19.5.3.2.1.7 Creation and Improvement of Infrastructure

No creation or improvement of infrastructure is expected to result directly from the project. The City of Janesville plans to install a water main and a sewer main along the northern boundary of the site, but the project is not dependent on this construction.

19.5.3.2.1.8 Other Benefits

No other significant benefits have been identified.

19.5.3.2.2 Linear Accelerator Approach (Production of Mo-99 Only)

19.5.3.2.2.1 Environmental Degradation

The environmental impacts expected to result from construction and operation of the linear accelerator technology are summarized below.

Air Quality

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of conventional air pollutants. Similarly to the SHINE facility, these emissions would be expected to result from natural gas heating of the facility buildings, periodic testing of the emergency diesel generator, and the SHINE process.

Water Quality

- Facility construction results in some discharge of suspended solids to local drainage ditch systems.
- No information is available on the depth of excavation required for this type of facility. However, the depth to the lowest subfloor is assumed to be similar to the SHINE facility, and on that basis dewatering of groundwater is not expected to be required.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.
- Facility operation requires water for use in SHINE, isotope processing, potable water, fire protection, and facility heating and cooling systems. All required water is withdrawn from the City of Janesville water supply system.
- Facility operation requires discharge of wastewater, including sanitary wastes, blowdown from building heating boilers, and liquid wastes from SHINE and isotope processing. All wastewater is discharged to the City of Janesville sanitary sewer system and complies with local, state, and federal pre-treatment and wastewater discharge requirements.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agriculture lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.
- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out-of-character with the site setting.
- During facility operation, the existing agricultural landscape is permanently altered, but the facility appearance is consistent with light industrial uses associated with the Southern Wisconsin Regional Airport.

Socioeconomics

- Facility construction results in some temporary increases in noise due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.

Land Use

- Facility construction would result in the permanent conversion of approximately 30 ac. (12.1 ha) of agricultural lands to industrial land use. Temporary conversion of land to support construction activities would be expected to be similar to the SHINE facility, which means that approximately 14 ac. (5.7 ha) of agricultural lands would be temporarily converted to industrial use.
- Facility operation does not result in additional on-site land use impacts.
- No off-site land use impacts are expected during construction or operation except for minor construction of housing to serve facility workers who move into the site area.

19.5.3.2.2.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts would be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public would be exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials would be strictly controlled, and all radiological doses would comply with regulatory limits.

19.5.3.2.2.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project is not expected to result in any transportation impacts except for the minor traffic impacts on local roads discussed in Subsection 19.5.3.2.2.1.

19.5.3.2.2.4 Environmental Benefits

Construction of this type of facility would be expected to create approximately the same number of construction jobs as the SHINE facility, which means approximately 420 construction jobs during the peak of construction activities. Facility operation would create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified.

In addition to economic benefits, the project would also benefit the health of people who need diagnostic tests that require Tc-99m. The facility would be expected to produce approximately the same amount of Tc-99m as the SHINE facility, which means it would satisfy approximately half of the annual demand for these isotopes in the United States. This represents a significant health benefit. However, this type of facility would not produce I-131 and Xe-133, as the SHINE facility does.

19.5.3.2.2.5 Production of Commercial Products

The linear accelerator SHINE facility is designed for increasing production when required by demand. However, at full production the facility would be expected to produce 3,000 6-day Ci per week, which means it has the capacity to produce up to approximately 156,000 6-day Ci of Mo-99 per year.

19.5.3.2.2.6 Increase in Tax Payments

The facility would be expected to pay approximately the same amount of taxes as the SHINE facility. This means that the facility would pay property taxes of approximately $635,000 per year during construction and approximately $660,000 per year during operation (after expiration of an initial 10-year TIF agreement), representing an increase of approximately 0.30 percent in the annual property tax revenues of Rock County .

19.5.3.2.2.7 Creation and Improvement of Infrastructure

No creation or improvement of infrastructure would be expected to result directly from the project. The City of Janesville plans to install a water main and a sewer main along the northern boundary of the site, but the project is not dependent on this construction.

19.5.3.2.2.8 Other Benefits

No other significant benefits have been identified.

19.5.3.2.3 Low Enriched Uranium (LEU) Aqueous Homogeneous Reactor Approach (Production of Mo-99, I-131, and Xe-133)

19.5.3.2.3.1 Environmental Degradation

The environmental impacts expected to result from construction and operation of the LEU Aqueous Homogeneous Reactor technology are summarized below.

Air Quality

- Facility construction results in fugitive dust emissions and exhaust emissions due to on road and off-road vehicles.
- Facility operation results in minor emissions of conventional air pollutants. Similarly to the SHINE facility, these emissions would be expected to result from natural gas heating of the facility buildings, periodic testing of the emergency diesel generator, and the SHINE process.

Water Quality

- Facility construction results in some discharge of suspended solids to local drainage ditch systems.
- No information is available on the depth of excavation required for this type of facility. However, the depth to the lowest subfloor is assumed to be similar to the SHINE facility, and on that basis dewatering of groundwater is not expected to be required.
- Increased potential for oil or chemical discharges to surface water and groundwater due to accidental spills during construction and operation. Very small probability of release, because of oil and chemical control measures.
- Facility operation requires water for use in SHINE, isotope processing, reactor cooling, potable water, fire protection, and facility heating and cooling systems. All required water is withdrawn from the City of Janesville water supply system.
- Facility operation requires discharge of wastewater, including sanitary wastes, blowdown from building heating boilers, and liquid wastes from SHINE and isotope processing. All wastewater is discharged to the City of Janesville sanitary sewer system and complies with local, state, and federal pre-treatment and wastewater discharge requirements.
- Developed facility site results in minor pollutant loads and increased runoff from roadways, parking areas, industrial activities, and landscaping.

Biotic Resources

- Facility construction results in limited disturbance to on-site agriculture lands and minor displacement of migrating birds that use the agricultural lands to feed.
- Construction activities, noise, and lighting result in some displacement of fauna, particularly birds and mammals.
- Potential for bird collisions with man-made structures, such as cranes and buildings during construction.

- Facility operation does not result in additional impacts except minor potential for bird collisions with buildings and minor disturbance of wildlife due to security lighting at night.

Aesthetic Resources

- During facility construction, dust, cranes, and facility structures partially obstruct views of existing landscape and create some visual elements that are out-of-character with the site setting.
- During facility operation, the existing agricultural landscape is permanently altered, but the facility appearance is consistent with light industrial uses associated with the Southern Wisconsin Regional Airport.

Socioeconomics

- Facility construction results in some temporary increases in noise due to use of heavy equipment on the site and construction workforce traffic in early morning and late afternoon.
- Facility operation results in minor increases in noise primarily due to vehicle movements associated with employees and deliveries/shipments of supplies and products. Normal operations include noise from stationary equipment, such as heating, cooling, and ventilation equipment. Continuous noise levels at the site boundary are maintained below local and state noise limit criteria.
- Facility construction results in some temporary increase in local traffic due to construction workforce traffic in early morning and late afternoon and periodic construction vehicle traffic throughout the work day.
- Facility operation results in minor increase in local traffic due to vehicle movements associated with employees and deliveries/shipments of supplies and products.
- Facility construction results in some temporary increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and wastewater treatment facilities to serve construction workers who move into the site area.
- Facility operation results in minor increase in demand for housing, public education resources, police, fire, medical and social services, parks and recreation facilities, and water supply and treatment facilities to serve operations workers who move into the site area.

Land Use

- Construction of this type of facility would be expected to result in approximately the same land disturbance as the SHINE facility, which means the permanent conversion of approximately 26 ac. (10.5 ha) of agricultural lands to industrial land use and the temporary conversion of approximately 14 ac. (5.7 ha) of agricultural lands to industrial land use.
- Facility operation does not result in additional on-site land use impacts.
- No off-site land use impacts are expected during construction or operation except for minor construction of housing to serve facility workers who move into the site area.

19.5.3.2.3.2 Effects on Public Health and Safety

During facility construction, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and fugitive dust), sanitary wastes, and conventional solid wastes. Any such impacts would be expected to be temporary and restricted to the immediate vicinity of the project site.

During facility operation, minor impacts to public health and safety might result from vehicle traffic, air pollution emissions (vehicle exhaust and emissions of conventional pollutants from stationary equipment), sanitary wastes, and conventional solid wastes. In addition, the public would be exposed to minor doses of radiation due to transportation of radioactive materials to and from the site, as well as direct radiation and releases of gaseous effluents from the SHINE process. All radioactive materials would be strictly controlled, and all radiological doses would comply with regulatory limits.

19.5.3.2.3.3 Other Costs

No other environmental costs, such as lost tax revenues or decreased recreational values, have been identified. The project is not expected to result in any transportation impacts except for the minor traffic impacts on local roads discussed in Subsection 19.5.3.2.4.1.

19.5.3.2.3.4 Environmental Benefits

Construction of this type of facility would be expected to create approximately the same number of construction jobs as the SHINE facility, which means approximately 420 construction jobs during the peak of construction activities. Facility operation would create approximately 150 permanent operational jobs. In addition, the wages earned and money spent by facility employees will stimulate additional economic activity, but this benefit has not been quantified.

In addition to economic benefits, the project also would benefit the health of people who need diagnostic tests that require Tc-99m and other isotopes. The facility would be expected to produce approximately the same amount of Tc-99m as the SHINE facility, which means it would satisfy approximately half of the annual demand for these isotopes in the United States. This represents a significant health benefit. The facility would also produce I-131 and Xe-133, which would have additional health benefits.

19.5.3.2.3.5 Production of Commercial Products

The facility would be expected to produce 3,000 6-day Ci per week, which means it would produce approximately 156,000 6-day Ci of Mo-99 per year. This translates to approximately 9,500,000 doses of Tc-99m per year for diagnostic tests. In addition, the facility would be expected to produce approximately 100,000 Ci of I-131 and 100,000 Ci of Xe-133 per year.

19.5.3.2.3.6 Increase in Tax Payments

The facility would be expected to pay approximately the same amount of taxes as the SHINE facility. This means that the facility would pay property taxes of approximately $635,000 per year during construction and approximately $660,000 per year during operation (after expiration of an initial 10-year TIF agreement), representing an increase of approximately 0.30 percent in the annual property tax revenues of Rock County.

19.5.3.2.3.7 Creation and Improvement of Infrastructure

No creation or improvement of infrastructure would be expected to result directly from the project. The City of Janesville plans to install a water main and a sewer main along the northern boundary of the site, but the project is not dependent on this construction.

19.5.3.2.3.8 Other Benefits

No other significant benefits have been identified.

19.5.4 COMPARISON OF THE POTENTIAL ENVIRONMENTAL IMPACTS

19.5.4.1 ALTERNATIVE SITES

This section compares the environmental impacts, costs, and benefits discussed in Subsections 19.5.2 and 19.5.3 for the alternative sites with the impacts, costs, and benefits expected at the SHINE project site, and evaluates whether any of the alternatives would reduce or avoid adverse effects.

Table 19.5.4-1 summarizes the expected environmental impacts of project construction at the SHINE project site (Janesville), each of the alternative sites (Chippewa Falls and Stevens Point), and the No-Action Alternative. Construction impacts at the SHINE project site are SMALL for every resource category. Both of the alternative sites have MODERATE construction impacts in several resource categories. Chippewa Falls and Stevens Point both have a MODERATE construction impact in Visual Resources, Noise, and Socioeconomic Transportation. In addition, Stevens Point has a MODERATE construction impact in Land Use and Ground Water Resources. As expected, the No-Action Alternative impacts are SMALL for every resource category as no construction would occur. However, the No-Action Alternative would not produce any of the benefits that would be produced by construction at the SHINE site or the alternative sites. These benefits include the creation of jobs and increases in tax payments to the local jurisdictions in which the site is located.

Table 19.5.4-2 summarizes the expected environmental impacts of project operation at the SHINE project site, each of the alternative sites, and the No-Action Alternative. Operation impacts at the SHINE project site and both of the alternative sites are SMALL for every resource category. As expected, the No-Action Alternative impacts are SMALL for every resource category as project operation would not occur. Again, however, the No-Action Alternative would not produce any of the benefits that would be produced by operation at the SHINE project site or the alternative sites. These benefits include the of jobs, increases in tax payments to the local jurisdictions in which the site is located, the production of valuable commercial products, and the significant health benefits of having a reliable domestic source of diagnostic isotopes.

Based on the information summarized above, neither of the alternative sites would reduce or avoid adverse effects as compared with the SHINE project site. The No-Action Alternative would avoid the environmental impacts associated with construction and operation, but since all of these impacts are SMALL at the SHINE project site, avoiding these impacts is not significant. The No-Action Alternative would not produce any of the benefits associated with the project.

19.5.4.2 ALTERNATIVE TECHNOLOGIES

This section compares the environmental impacts, costs, and benefits discussed in Subsections 19.5.2 and 19.5.3 for the alternative technologies with the impacts, costs, and benefits expected for the SHINE technology, and evaluates whether any of the alternatives would reduce or avoid adverse effects.

Table 19.5.4-3 summarizes the expected environmental impacts of project construction for the SHINE technology, each of the alternative technologies (linear accelerator technology and LEU aqueous homogeneous reactor), and the No-Action Alternative. Construction impacts for the SHINE technology are SMALL for every resource category. The alternative technologies also have SMALL construction impacts for every resource category. As expected, the No-Action

Alternative impacts are SMALL for every resource category as no construction would occur. However, the No-Action Alternative would not produce any of the benefits that would be produced by construction of the SHINE technology or the alternative technologies. These benefits include the creation of jobs and increases in tax payments to the local jurisdictions in which the project is located.

Table 19.5.4-4 summarizes the expected environmental impacts of project operation for the SHINE technology, each of the alternative technologies, and the No-Action Alternative. Operational impacts for the SHINE technology are SMALL for every resource category. The alternative technologies also have SMALL operational impacts for every resource category. As expected, the No-Action Alternative impacts are SMALL for every resource category as project operation would not occur. Again, however, the No-Action Alternative would not produce any of the benefits that would be produced by operation of the SHINE technology or the alternative technologies. These benefits include the creation of jobs, increases in tax payments to the local jurisdictions in which the site is located, the production of valuable commercial products, and the significant health benefits of having a reliable domestic source of diagnostic isotopes.

Based on the information summarized above, none of the alternative technologies would reduce or avoid adverse effects as compared with the SHINE technology. The No-Action Alternative would avoid the environmental impacts associated with construction and operation, but since all of these impacts are SMALL for the SHINE technology, avoiding these impacts is not significant. The No-Action Alternative would not produce any of the benefits associated with the project.

Table 19.5.4-1 Comparison of Construction Impacts for the SHINE Site and Alternative Sites

Category	SHINE (Janesville)	Chippewa Falls	Stevens Point	No-Action
Land Use Impacts	SMALL	SMALL	MODERATE	SMALL
Visual Resources Impacts	SMALL	MODERATE	MODERATE	SMALL
Air Quality Impacts	SMALL	SMALL	SMALL	SMALL
Noise Impacts	SMALL	MODERATE	MODERATE	SMALL
Geology, Soils, and Seismology Impacts	SMALL	SMALL	SMALL	SMALL
Water Resources Impacts				
Surface Water Impacts	SMALL	SMALL	SMALL	SMALL
Ground Water Impacts	SMALL	SMALL	MODERATE	SMALL
Ecological Resources Impacts				
Aquatic Resources	SMALL	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	SMALL	SMALL
Historical and Cultural Resources Impacts	SMALL	SMALL	SMALL	SMALL
Socioeconomic Impacts				
Housing	SMALL	SMALL	SMALL	SMALL
Public Services	SMALL	SMALL	SMALL	SMALL
Public Education	SMALL	SMALL	SMALL	SMALL
Taxes	SMALL	SMALL	SMALL	SMALL
Transportation	SMALL	MODERATE	MODERATE	SMALL
Human Health Impacts				
Nonradiological Impacts	SMALL	SMALL	SMALL	SMALL
Radiological Impacts	SMALL	SMALL	SMALL	SMALL
Waste Management Impacts	SMALL	SMALL	SMALL	SMALL
Transportation Impacts	SMALL	SMALL	SMALL	SMALL
Postulated Accident Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Justice Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Benefits - Jobs	420	420	420	None
Environmental Benefits - Health	None	None	None	None
Production of Commercial Products	None	None	None	None
Property Tax Payments	$635,000 per year	$635,000 per year	$635,000 per year	None

Table 19.5.4-2 Comparison of Operation Impacts for the SHINE Site and Alternative Sites

Category	SHINE (Janesville)	Chippewa Falls	Stevens Point	No-Action
Land Use Impacts	SMALL	SMALL	SMALL	SMALL
Visual Resources Impacts	SMALL	SMALL	SMALL	SMALL
Air Quality Impacts	SMALL	SMALL	SMALL	SMALL
Noise Impacts	SMALL	SMALL	SMALL	SMALL
Geology, Soils, and Seismology Impacts	SMALL	SMALL	SMALL	SMALL
Water Resources Impacts				
Surface Water Impacts	SMALL	SMALL	SMALL	SMALL
Ground Water Impacts	SMALL	SMALL	SMALL	SMALL
Ecological Resources Impacts				
Aquatic Resources	SMALL	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	SMALL	SMALL
Historical and Cultural Resources Impacts	SMALL	SMALL	SMALL	SMALL
Socioeconomic Impacts				
Housing	SMALL	SMALL	SMALL	SMALL
Public Services	SMALL	SMALL	SMALL	SMALL
Public Education	SMALL	SMALL	SMALL	SMALL
Taxes	SMALL	SMALL	SMALL	SMALL
Transportation	SMALL	SMALL	SMALL	SMALL
Human Health Impacts				
Nonradiological Impacts	SMALL	SMALL	SMALL	SMALL
Radiological Impacts	SMALL	SMALL	SMALL	SMALL
Waste Management Impacts	SMALL	SMALL	SMALL	SMALL
Transportation Impacts	SMALL	SMALL	SMALL	SMALL
Postulated Accident Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Justice Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Benefits - Jobs	150	150	150	None
Environmental Benefits - Health	Reliable source of diagnostic isotopes	Reliable source of diagnostic isotopes	Reliable source of diagnostic isotopes	None
Production of Commercial Products	Mo-99, I-131, Xe-133	Mo-99, I-131, Xe-133	Mo-99, I-131, Xe-133	None
Property Tax Payments[(a)]	$660,000 per year	$660,000 per year	$660,000 per year	None

a) The number of required operation workers and property tax payments are expected to be the same for all sites.

Table 19.5.4-3 Comparison of Construction Impacts for the SHINE Technology and Alternative Technologies

Category	SHINE Technology	Linear Accelerator Technology	Low Enriched Uranium Aqueous Homogeneous Reactor	No-Action
Land Use Impacts	SMALL	SMALL	SMALL	SMALL
Visual Resources Impacts	SMALL	SMALL	SMALL	SMALL
Air Quality Impacts	SMALL	SMALL	SMALL	SMALL
Noise Impacts	SMALL	SMALL	SMALL	SMALL
Geology, Soils, and Seismology Impacts	SMALL	SMALL	SMALL	SMALL
Water Resources Impacts	SMALL	SMALL	SMALL	SMALL
Ecological Resources Impacts	SMALL	SMALL	SMALL	SMALL
Historical and Cultural Resources Impacts	SMALL	SMALL	SMALL	SMALL
Socioeconomic Impacts	SMALL	SMALL	SMALL	SMALL
Human Health Impacts	SMALL	SMALL	SMALL	SMALL
Waste Management Impacts	SMALL	SMALL	SMALL	SMALL
Transportation Impacts	SMALL	SMALL	SMALL	SMALL
Postulated Accident Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Justice Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Benefits - Jobs	420	420	420	None
Environmental Benefits - Health	None	None	None	None
Production of Commercial Products	None	None	None	None
Property Tax Payments	$635,000 per year	$635,000 per year	$635,000 per year	None

Table 19.5.4-4 Comparison of Operation Impacts for the SHINE Technology and Alternative Technologies

Category	SHINE Technology	Linear Accelerator Technology	Low Enriched Uranium Aqueous Homogeneous Reactor	No-Action Alternative
Land Use Impacts	SMALL	SMALL	SMALL	SMALL
Visual Resources Impacts	SMALL	SMALL	SMALL	SMALL
Air Quality Impacts	SMALL	SMALL	SMALL	SMALL
Noise Impacts	SMALL	SMALL	SMALL	SMALL
Geology, Soils, and Seismology Impacts	SMALL	SMALL	SMALL	SMALL
Water Resources Impacts	SMALL	SMALL	SMALL	SMALL
Ecological Resources Impacts	SMALL	SMALL	SMALL	SMALL
Historical and Cultural Resources Impacts	SMALL	SMALL	SMALL	SMALL
Socioeconomic Impacts	SMALL	SMALL	SMALL	SMALL
Human Health Impacts	SMALL	SMALL	SMALL	SMALL
Waste Management Impacts	SMALL	SMALL	SMALL	SMALL
Transportation Impacts	SMALL	SMALL	SMALL	SMALL
Postulated Accident Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Justice Impacts	SMALL	SMALL	SMALL	SMALL
Environmental Benefits - Jobs	150	150	150	None
Environmental Benefits - Health	Reliable source of diagnostic isotopes	Reliable source of diagnostic isotopes	Reliable source of diagnostic isotopes	None
Production of Commercial Products	Mo-99, I-131, Xe-133	Mo-99	Mo-99, I-131, Xe-133	None
Property Tax Payments[(a)]	$660,000 per year	$660,000 per year	$660,000 per year	None

a) The number of required operation workers and property tax payments are assumed to be the same for all technologies.