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Acronyms and Abbreviations

<u>Acronym/Abbreviation</u>	<u>Definition</u>
ac.	acre
BMP	best management practice
ha	hectare
kg	kilogram
LOS	level of service
NO _x	nitrogen oxides
OSHA	Occupational Safety and Health Administration
ROI	Region of Influence
SH	State Highway
SHINE	SHINE Medical Technologies, Inc.
SWPPP	Storm Water Pollution Prevention Plan
US	U.S. Highway
WDNR	Wisconsin Department of Natural Resources
WHS	Wisconsin Historical Society

CHAPTER 19

19.6 CONCLUSIONS

19.6.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Unavoidable adverse impacts are predicted adverse environmental impacts that cannot be avoided and for which there are no practical means of further mitigation. This section considers unavoidable adverse impacts from construction and operation of the proposed SHINE Medical Technologies, Inc. (SHINE) facility.

19.6.1.1 Unavoidable Adverse Environmental Impacts of Construction

Construction impacts and measures and controls available to reduce or eliminate impacts are discussed in detail in Section 19.4. As described in the section, all impacts are SMALL, as they are either not detectable or are minor compared to the availability of the affected resources. Table 19.6.1-1 summarizes construction-related impacts that result in a measurable loss or permanent change in resources, the mitigation and control measures available to reduce those impacts, and the remaining unavoidable adverse impacts after mitigation and control measures are applied. For many of the impacts related to construction activities, the mitigation measures are referred to as best management practices (BMPs). Typically, these mitigation measures are based on the types of activities that are to be performed. The mitigation measures are implemented through permitting requirements, and plans and procedures developed for the construction activities.

Unavoidable adverse impacts from construction of the SHINE facility include changing land use on 25.67 acres (ac.) (10.39 hectares [ha]) of agricultural/cultivated crop land to industrial facilities, the conversion of prime farmland and farmland of statewide importance to industrial land, and partial obstruction of views of the existing landscape. Since there are no streams, ponds, or water bodies present on the SHINE site, potential construction-related impacts to water resources are limited to off-site impacts associated with runoff and siltation.

Impacts to agricultural/cultivated crop land from construction of the facility are mitigated by returning lands within the site boundary that surround the interior developed areas to either cultivated fields or restored native landscapes upon completion of construction. To minimize impacts to visual resources, landscaping of the site along U.S. Highway 51 (US 51) street frontage and bordering access road will be performed. Open spaces around the facility structures are vegetated with cool-season lawn and shrub borders. Impacts from stormwater runoff are mitigated with stormwater management plans and BMPs during construction.

Construction activities also temporarily impact 14.54 ac. (5.88 ha) of agricultural lands used for the construction parking area, construction material staging or lay down area, and water and sewer line installation. Temporary impact areas are either returned to agriculture or restored with either cool-season grasses or native prairie.

Construction activities result in unavoidable localized increases in air emissions and noise. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, noise, and vibration that may potentially impact both on-site workers and off-site residents of the community. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the SHINE site, particularly during shift

changes. Emissions from construction activities and equipment are minimized through implementation of mitigation measures, including proper maintenance of construction equipment and vehicles. Posted speed limits, traffic control and administrative measures, such as staggered shift hours, will reduce traffic noise during the weekday business hours. By implementation of mitigation measures, emissions and noise impacts associated with construction activities are temporary and localized at and near the SHINE site.

19.6.1.2 Unavoidable Adverse Environmental Impacts of Operations

Operational impacts and measures and controls available to reduce or eliminate impacts are discussed in detail in Section 19.4. As described in the section, all impacts are SMALL, as they are either not detectable or are minor compared to the availability of the affected resources. Table 19.6.1-2 summarizes operations-related impacts that result in a measurable loss or permanent change in resources, the mitigation and control measures available to reduce these impacts, and the remaining adverse impacts after mitigation and control measures are applied. As indicated in Table 19.6.1-2 most of the adverse impacts are either avoidable or negligible after mitigation and control measures are considered.

Unavoidable adverse impacts from operation of the SHINE facility include a change to the viewshed, potential storm water runoff to the intermittent stream or Rock River, and infrequent bird collisions with buildings. Minor visual impacts to the viewshed will occur as a result of the main building and exhaust vent stack. However, the surrounding viewshed includes light industrial development, therefore impacts are minor. Stormwater runoff during plant operation is controlled through a vegetated on-site detention swale. Infrequent bird collisions with buildings at the SHINE facility and associated structures may result in some bird mortality. Most buildings on the SHINE site have a relatively low profile, therefore effects on bird populations from collisions with buildings is minimized.

The operation of the SHINE facility will result in a slight degradation in the level of service (LOS) at the signalized intersection of US 51 and State Highway (SH) 11. Specifically, the westbound SH 11 to southbound US 51 left-turning movement is affected during the morning peak hour. This condition is easily mitigated by optimizing the signal timing for this turning movement, which will improve the LOS to its existing level.

19.6.1.3 Summary of Adverse Environmental Impacts from Construction and Operations

Tables 19.6.1-1 and 19.6.1-2 indicate that all of the adverse environmental impacts associated with the new facility construction and operation are SMALL and are further reduced through the application of mitigation and control measures.

Most of the impacts from construction and operation are SMALL due to design features that result in lower levels of impacts, BMPs that control and mitigate emissions and discharges to air and water, use of agricultural/cultivated crop lands that were previously altered or disturbed, and applicable federal and state permitting requirements designed to protect humans and biota. These SMALL impacts generally have no detectable adverse impacts or only minor adverse impacts.

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 1 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Land Use and Visual Resources	<p>Construction of new facility will permanently impact 25.67 ac. (10.39 ha) of agricultural/cultivated crop land.</p> <p>Impacts include conversion of prime farmland and farmland of statewide importance to industrial land.</p>	<p>Construction activities comply with all relevant federal, state, and local regulatory requirements, including BMPs and stormwater management plans to control erosion and runoff.</p> <p>Impacts to agricultural/cultivated crop land are mitigated by returning lands within the site boundary that surround the interior developed areas to cultivated fields or restored native landscapes or cool-season grasses upon construction completion.</p>	<p>A total of 25.67 ac. (10.39 ha) of agricultural/cultivated crop land is lost.</p> <p>Amount of prime farmland or farmland of statewide importance lost is minor in context of region.</p>
	<p>Partial obstruction of views of the existing landscape.</p>	<p>Visual impacts are minimized through landscaping of the site. Open spaces around the facility structures are vegetated with cool-season lawn and shrub borders.</p>	<p>A minor change in existing landscape is expected.</p>
	<p>Temporary impact of 14.54 ac. (5.88 ha) of agricultural lands used for construction parking area, construction material staging or lay down area, and water and sewer line installation.</p>	<p>Temporary impact areas are either returned to agriculture or restored with either cool-season grasses or native prairie.</p>	<p>Some localized short-term impacts to temporary impact areas are expected.</p>

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 2 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Geologic Resources	Potential local adverse impacts due to excavation and other construction related activities.	<p>Geologic resources at the site are the same throughout the region and do not include any unique or rare geological resources.</p> <p>No mitigation measures beyond compliance with local building codes are anticipated as no significant impacts due to large scale or local hazards are identified.</p>	Unavoidable adverse environmental impacts are not anticipated.
Water Use	All public water supplies in Rock County are sourced from groundwater. Additional needs during construction are identified and are satisfied under existing system capacities.	Water and sewer utility lines will be installed by the City of Janesville in support of the overall TIF development on the north side of the site. No additional upgrades or mitigation measures are expected.	Unavoidable adverse environmental impacts are not anticipated.
Water Quality	Potential impacts are limited to off-site areas and are associated with runoff and siltation into roadside swales.	BMPs will be used in accordance with the Storm Water Pollution Prevention Plan (SWPPP) as required by the Wisconsin Department of Natural Resources (WDNR) to prevent sediment runoff and subsequent siltation in off-site areas during construction.	Unavoidable adverse environmental impacts are not anticipated.
Terrestrial Ecology	Wildlife potentially affected by construction, includes bird, mammal, and/or herpetofauna species.	Area is routinely disturbed for agriculture and there are no water resources on-site, therefore wildlife use of the site is low.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 3 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Terrestrial Ecology, cont'd	There is a potential for bird collisions with man-made structures such as cranes and buildings during construction.	Based on findings of NUREG-1437, the effects of avian collisions with man-made structures occur at very low frequencies.	Unavoidable adverse environmental impacts are not anticipated.
	Artificial lighting could create or exacerbate an avian-collision hazard if tall cranes are illuminated during nighttime construction.	For any nighttime construction, BMPs such as shielding and appropriate directional lighting are used to mitigate the hazards to wildlife associated with artificial nighttime illumination.	Unavoidable adverse environmental impacts are not anticipated.
	Potential impacts to state or federal threatened/endangered species or species of special concern identified within the region.	<p>Consultation identified state and federally listed species in the region, however none on the SHINE site.</p> <p>None of the listed species were observed on-site during field reconnaissance surveys.</p> <p>Sensitive species located in off-site riparian areas could be affected indirectly during construction via stormwater runoff from the site. The use of appropriate BMPs during construction combined with the distance to the nearest off-site areas minimizes impacts to any protected species.</p>	Unavoidable adverse environmental impacts are not anticipated.
Aquatic Ecology	Potential impacts are limited to off-site areas associated with runoff and siltation into the small intermittent stream and Rock River.	BMPs will be used in accordance with the SWPPP as required by the WDNR to prevent sediment runoff and subsequent siltation in receiving streams during construction.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 4 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Socioeconomics	There is a minor potential increase in the local population and associated increased demand for local public services, schooling, housing, and land.	Estimated population increases are relatively small compared to the population in the ROI. Increases in local tax revenues support increased services. Specific measures and controls are not needed as impacts are minor.	Unavoidable adverse environmental impacts are not anticipated.
	Potential impacts in traffic infrastructure and patterns due to increased traffic from construction-related vehicles.	Construction-related traffic does not affect the level of service anywhere in the transportation infrastructure and no modifications to the infrastructure are necessary.	Unavoidable adverse environmental impacts are not anticipated.
Human Health	Potential impacts to the general public and construction workforce include dust and other air emissions during construction.	BMPs including dust control plans are implemented during construction to minimize fugitive dust.	Minor localized increases in air emissions will occur, mostly at and near the SHINE site.
Radiation Exposure	Potential adverse impacts to the general public and construction workforce from the construction and handling of isotope production equipment and supplies.	Exposure is minimized through safe handling procedures and robust Radiation Protection and ALARA Programs.	Unavoidable adverse environmental impacts are not anticipated.
Air Quality	Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, noise, and vibration and may potentially impact both on-site workers and off-site residents of the community.	BMPs and dust control plans are used for controlling fugitive dust.	Minor localized increases in air emissions will occur, mostly at and near the SHINE site.
		Proper maintenance of construction equipment and vehicles is used to control air emissions.	Detectable changes to local meteorology are not anticipated.

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 5 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Air Quality, cont'd	Painting, coating and similar operations also generate emissions from the use of volatile organic compounds.	Contractors, vendors, and subcontractors will adhere to appropriate federal and state occupational health and safety regulations.	Unavoidable adverse environmental impacts are not anticipated.
	On-site equipment use and traffic due to construction activities can result in local increases in emissions.	Potential air quality impacts are limited as the project is in an attainment area and is largely surrounded by agricultural fields and other undeveloped areas.	Unavoidable adverse environmental impacts are not anticipated.
Noise	Potential impacts due to increase in noise levels from construction equipment, including to nearby residences, churches, and recreational areas.	On-site noise level exposure is controlled through appropriate training, personnel protective equipment, periodic health and safety monitoring, and industry good practices. Noise levels from equipment are expected attenuate rapidly between the site and the nearest sensitive noise receptors.	Unavoidable adverse environmental impacts are not anticipated.
	Potential increase in traffic noise associated with construction workforce traveling to and from the SHINE site, particularly during shift changes.	Posted speed limits, traffic control and administrative measures, such as staggered shift hours reduces traffic noise during weekday business hours.	Potential noise impacts are intermittent and limited primarily to shift changes.
Environmental Justice	There is potential for adverse impacts to low-income and minority populations.	Populations classified as low income are distant from the site not impacted by the SHINE facility.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-1 Construction-Related Unavoidable Adverse Environmental Impacts
(Sheet 6 of 6)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Historic and Cultural Resources	No adverse impacts on cultural or historic resources have been identified.	A Phase I study was performed and the Wisconsin Historical Society (WHS) reviewed the findings and indicated that no further consultation is needed.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-2 Operations-Related Unavoidable Adverse Environmental Impacts
(Sheet 1 of 4)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Land Use and Visual Resources	Visual impacts as a result of the main building and exhaust vent stack.	The majority of the facility structures have a relatively low profile. The exhaust vent stack will extend to 96 feet (29 meters) above grade. No mitigation is required.	Minor impacts to viewscape will occur, however the surrounding viewshed includes similar light industrial development, therefore impacts are small.
Geologic Resources	Potential impacts from sediment erosion at the site.	The primary soils present at the site are classified as slightly erodible and the secondary soils are classified as moderately erodible. No mitigation is required.	Unavoidable adverse environmental impacts are not anticipated.
Water Use	Potential impact on water supply for the region based on demand from SHINE facility.	The City of Janesville has determined the current system has more than enough capacity to support the increase in demand. No mitigation is required.	Unavoidable adverse environmental impacts are not anticipated.
Water Quality	Potential impacts from stormwater runoff to the intermittent stream or Rock River.	A vegetated on-site detention swale is used to control stormwater runoff.	Mitigation measures in combination with the distance to the water bodies will minimize runoff and siltation to off-site areas.
Terrestrial Ecology	Possible exposure of terrestrial fauna and flora to herbicides due to vegetation management practices may occur.	Herbicides are applied per an integrated pest management plan and applicable permit/BMP requirements.	Unavoidable adverse environmental impacts are not anticipated.
	Infrequent bird collisions with buildings resulting in mortality can occur.	Most buildings on the SHINE site have a relatively low profile, minimizing bird collisions.	Effects on bird populations from collisions with buildings are minimized and are not anticipated to be significant.

**Table 19.6.1-2 Operations-Related Unavoidable Adverse Environmental Impacts
(Sheet 2 of 4)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Aquatic Ecology	Potential impacts from stormwater runoff to the off-site intermittent stream or Rock River.	A vegetated on-site detention swale is used to control storm water runoff.	Mitigation measures in combination with the distance to the water bodies will minimize runoff and siltation to off-site receiving streams.
Socioeconomics	An increase in the Region of Influence (ROI) population of 0.08 percent will occur to support the operations workforce, potentially impacting social services.	Adequate housing, school capacity, water supply and water treatment capacities exist to accommodate minor population increase; therefore, mitigation is not required.	Unavoidable adverse environmental impacts are not anticipated.
	Potential beneficial impacts to tax revenues to Janesville and Rock County.	There is an increase in tax revenues collected by county and regional taxing authorities which does have beneficial impacts. No mitigation is required.	Unavoidable adverse environmental impacts are not anticipated.
	Increased traffic along US 51 coming from the north, resulting in a slight decrease in LOS at the intersection of US 51 and SH 11 during morning peak hour.	Traffic impacts are mitigated by optimizing the signal timing at the intersection to accommodate a greater turning movement from westbound SH 11 to southbound US 51.	By optimizing signal timing at the intersection, the LOS for the intersection is improved to its existing level.
Human Health	Potential pathways of public exposure to chemicals include air, land, and water.	Control systems to minimize potential exposure to the public include conveyance of all wastewater produced from the facility to the City of Janesville wastewater treatment facility, use of swales to control off-site runoff, erosion control measures, and air emission controls.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-2 Operations-Related Unavoidable Adverse Environmental Impacts
(Sheet 3 of 4)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Radiation Exposure	Potential adverse impacts to the general public and operations workforce from isotope production and associated waste.	Site shielding design of the buildings minimizes radiation exposure of the public outside the buildings. Exposure of the workforce is minimized through compliance with OSHA standards.	Unavoidable adverse environmental impacts are not anticipated.
Air Quality	Increased vehicle emissions and dust from the commuting workforce and routine deliveries to/from the SHINE facility.	The volume of traffic during operations is considerably lower than during construction. Vehicles are largely limited to paved areas, reducing the emissions of fugitive dust.	Unavoidable adverse environmental impacts are not anticipated.
	Emissions from the natural gas-fired boiler and heaters.	Emissions of nitrogen oxides (NO _x) from the boiler are controlled using low-NO _x burners, which produces lower NO _x emissions during the combustion process. Emissions from the heaters are controlled using combustion controls and properly designed and tuned burners.	No impacts exceed the primary ambient air quality standards that are established to protect public health; therefore unavoidable adverse environmental impacts are not anticipated.
Noise	Noise generated during operations relates primarily to vehicular movements associated with employees and deliveries.	The number of work-related trips is minor relative to the existing traffic flow on US 51 and does not result in notable increased noise emissions.	Unavoidable adverse environmental impacts are not anticipated.
	External noise emissions from the SHINE facility during operation may impact surrounding sensitive noise receptors.	Operational noise from the facility is primarily limited by the walls and other physical barriers of the facility itself.	Unavoidable adverse environmental impacts are not anticipated.

**Table 19.6.1-2 Operations-Related Unavoidable Adverse Environmental Impacts
(Sheet 4 of 4)**

Element	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impacts
Environmental Justice	No adverse impacts on minority or low-income populations have been identified.	Level of impact is comparable for all populations and mitigation is not required.	Impacts to low income and minority populations are not anticipated.
Historic and Cultural Resources	No adverse impacts on cultural or historic resources have been identified.	A Phase I study was performed and the WHS reviewed the findings and indicated that no further consultation is needed.	Unavoidable adverse environmental impacts are not anticipated.

19.6.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

This Environmental Report focuses on the analyses and resulting conclusions associated with the environmental impacts from activities during the new plant construction and operation at the SHINE site. These activities are considered short-term uses for purposes of this section. In this section, the long-term is considered to be initiated with the conclusion of new facility decommissioning at the SHINE site. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the SHINE site.

19.6.2.1 Construction of the SHINE Facility and Long-Term Productivity

Subsection 19.6.1.1 summarizes the potential unavoidable adverse environmental impacts of construction and the measures proposed to reduce those impacts. Some SMALL adverse environmental impacts could remain after all practical measures to avoid or mitigate them are taken. However, none of these impacts represent long-term effects that preclude any options for future use of the SHINE site.

The acreage disturbed during construction of the facility is larger than that required for the actual structures and other ancillary facilities because of the need for construction parking areas, and construction material staging and laydown areas. Preparation of these on-site areas coupled with noise from construction activities, may displace some wildlife and alter existing vegetation. Once the new facility is completed, the areas not needed for operations are returned to agricultural land or restored with either cool-season grasses or native prairie.

Construction of the SHINE facility includes the installation of water and sewer lines that connect the facility to the City of Janesville water supply system. This additional infrastructure will be available and beneficial to any future use of the SHINE site after decommissioning.

Noise emitted by some construction activities increases the ambient noise levels on-site and in adjacent off-site areas. During construction, the workforce is protected from excessive noise levels by adherence to the Occupational Safety and Health Administration (OSHA) requirements within high noise environments. There are no effects on the long-term productivity of the SHINE site as a result of these impacts.

Construction traffic increases the volume of traffic on local roads, but does not have an adverse impact on the LOS. Consequently, no modifications to the traffic infrastructure are necessary and there are no effects on long-term productivity.

Facility construction has beneficial socioeconomic effects on the local area such as new construction-related jobs, local spending by the construction workforce, and payment of taxes within the area and region. The in-migration of the construction and operation workforce support the expansion of existing small businesses or locations for new small businesses that might serve SHINE and its employees. The beneficial impacts from the in-migration of the construction workforce and indirect economic output and employment resulting from construction expenditures to the communities within the region of influence (ROI) cease once construction is complete. However, the changes that are the result of increased tax revenues continue throughout the operational life of the facility.

Construction of the SHINE facility will have no impacts on populations identified as minority or low-income as minority populations are lacking within the region around the SHINE site, and low income populations are limited to isolated areas in the center of Janesville. Therefore, there are no effects on the long-term productivity of the SHINE site as a result of impacts on environmental justice.

19.6.2.2 Operation of the SHINE Facility and Long-Term Productivity

Subsection 19.6.1.2 summarizes the potential unavoidable adverse environmental impacts of operation and the measures proposed to reduce or eliminate those impacts. Some SMALL adverse environmental impacts could remain after all practical measures to avoid or mitigate them are taken. However, none of these impacts represent long-term effects that preclude any options for future use of the SHINE site.

The SHINE site is located in an area that has previously been disturbed for agricultural use and is currently zoned for industrial use as an amendment to the Tax Increment Financing No. 35 Project Plan. Therefore, operation of the new facility represents a continuation of the planned land use. Once the facility is decommissioned to Nuclear Regulatory Commission standards, the land could be available for other industrial or non-industrial uses.

During operation, noise levels are expected to decrease to ambient levels as facility-generated noise is limited by the walls and other physical barriers of the facility itself. Operation of the new facility will slightly increase air emissions from the boiler and stacks. The equipment is operated in accordance with applicable federal, state, and local regulations, and is not expected to result in any long-term decrease in regional air quality. Preliminary modeling shows that for all pollutants except for the 1-hour nitrogen oxides (NO_x), the maximum concentrations are below the Significant Impact Level.

Operation of the SHINE facility will have a comparable impact on all populations in the region around the site. No impacts are expected to either minority or low income populations as minority populations are lacking within the region around the SHINE site, and low income populations are limited to isolated areas in the center of Janesville. Therefore there are no long-term effects to environmental justice that preclude any options for future use of the SHINE site.

19.6.2.3 Summary of the Relationship Between Short-Term Use and Long-Term Productivity

The impacts resulting from the SHINE facility construction and operation result in both adverse and beneficial short-term impacts. The principal short-term adverse impacts are SMALL residual impacts (after mitigation measures are implemented) to land use, terrestrial ecology, local traffic, and air quality. There are no long-term impacts to the environment. The principal short-term benefits are the creation of additional jobs, additional tax revenues, and improvements to local infrastructure. The principal long-term benefit is the continued availability of the improved infrastructure and potential benefits from increased tax revenues after facility decommissioning. The short-term impacts and benefits and long-term benefits do not affect long-term productive use of the SHINE site.

19.6.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This subsection describes the expected irreversible and irretrievable environmental resource commitments used in the new facility construction and operation. The term irreversible commitments of resources describes environmental resources that are potentially changed by the new facility construction or operation and that could not be restored at some later time to the resource's state prior to construction or operation. Irretrievable commitments of resources are generally materials that are used for the new facility in such a way that they could not, by practical means, be recycled or restored for other uses.

19.6.3.1 Irreversible Environmental Commitments of Resources

Irreversible environmental resource commitments resulting from the new facility, in addition to the materials used for radioisotope production are described in the following sections.

19.6.3.1.1 Land Use

The land used for the SHINE facility is not irreversibly committed because once SHINE ceases operations and the facility is decommissioned in accordance with Nuclear Regulatory Commission requirements, the land supporting the facilities could be returned to other industrial or nonindustrial uses. There is no storage or disposal of radioactive and nonradioactive wastes at the site. Medical isotopes are not stored for any significant time period as these items are transported to clients as quickly as possible. Irradiated enriched uranium is not an issue as the facility cleans up and recycles this material rather than storing spent nuclear fuel. Approximately 26 ac. (10.5 ha) of prime farmland or farmland of statewide importance on the SHINE site could be irreversibly converted to developed land or experience surface soil damage during temporary use such that the soil properties responsible for the prime farmland designation would be irreversibly damaged.

19.6.3.1.2 Hydrologic Resources

The new facility requires water from the Janesville Water Utility to use for construction, isotope production, potable water, fire protection, and facility heating and cooling. The City of Janesville provides water supply for both public drinking and fire protection through groundwater wells. The average estimated water usage by the SHINE facility during operations is 6070 gallons (22,977 L) per day and a consumptive water use of 1560 gallons (5905 L) per week. According to the city of Janesville, the total pumping capacity of its eight groundwater wells is 29 Mgd (109.8 Mld). Average water usage is about 11 Mgd (41.6 Mld). Accordingly, the excess capacity of the Janesville water supply system is approximately 18 Mgd (68.1 Mld). Because there is excess capacity within the Janesville water supply system, there are no indirect effects associated with the demand from the SHINE facility. There are no direct impacts to water quality or hydrology from the SHINE facility; therefore there will be no irreversible impacts.

19.6.3.1.3 Ecological Resources

Long-term irreversible losses of terrestrial biota are not anticipated. Subsequent to the completion of construction, floral and faunal resources are expected to recover in areas that are not affected by on-going operations. Floral resources at the site and in the region are limited to agricultural/cultivated crop plants. Losses of fauna due to operations are primarily attributable to

bird collisions with buildings at the facility as wildlife occurrence on the site is relatively infrequent. There are no wetlands or water bodies located at the SHINE site.

All water for the SHINE facility is provided by the Janesville Water Utility, therefore, water supply intake or cooling water intake structures on the Rock River are not needed. Thus, there are no operational impacts associated with impingement or entrainment of aquatic biota. Furthermore, the SHINE facility does not discharge directly into the Rock River or any other nearby water body thus, avoiding any impacts associated with pollutant or thermal discharges to aquatic resources. In addition, a vegetated on-site detention swale is used to control stormwater runoff which, when combined with the distance to the nearest off-site water bodies minimizes runoff and siltation to off-site receiving streams.

19.6.3.1.4 Socioeconomic Resources

No irreversible commitments will be made to socioeconomic resources because they are reallocated for other purposes once the facility is decommissioned.

19.6.3.1.5 Historic and Cultural Resources

No known historic or cultural resources are irreversibly altered due to the SHINE facility.

19.6.3.1.6 Air Quality

Dust and other emissions, such as vehicle exhaust, are released to the air during construction activities. Implementation of controls and limits at the source of emissions on the construction site result in reduction of impacts off-site. The dust control program reduces dust due to construction activities to minimize dust reaching site boundaries. Specific mitigation measures are discussed in Subsection 19.4.2.1.1. During operations, emissions will be a product of vehicle exhaust, isotope production, and fuel combustion resulting in very low levels of gaseous pollutants and particulates released from the facility into the air. Contractors, vendors, and subcontractors are required to adhere to appropriate federal and state occupational health and safety regulations to protect workers from adverse conditions, including air emissions. Emissions during operations are in compliance with applicable Federal and State regulations, minimizing their impact on public health and the environment.

19.6.3.1.7 Irretrievable Commitments of Resources

Irretrievable commitments of resources during new plant construction are generally similar to that of any small-scale medical facility construction project. Unlike previous industrial construction, asbestos and other materials considered hazardous are not used or are used sparingly and in accordance with safety regulations and practices. Materials consumed during the construction phase are shown in Table 19.2.0-1. These materials are irretrievable unless they are recycled at decommissioning. Additionally, approximately 24,587 gallons of diesel fuel (as a bounding assumption all fuel is assumed to be diesel) is expected to be used on an average monthly basis (Subsection 19.2.0). Use of construction materials in the quantities associated with the facility has a SMALL impact with respect to the availability of such resources.

During operations, the main resource that is irreversibly and irretrievably committed is the uranium used as the source for the molybdenum isotope. The amount of uranium that SHINE will require on an annual basis and over the lifetime of the operating license (assuming a 30-year operating license) is very small when compared to the amount consumed by other users and the total global supply of uranium. The World Nuclear Association studies of supply and demand of uranium indicate that a total of 5,327,200 metric tons of uranium were available in 2011, representing an 80-year supply of uranium at current market prices based on known resources (World Nuclear Association, 2012). This could increase to a 200-year supply as market prices rise and other conventional sources of uranium are used. Therefore, the uranium that is used to generate the medical radioisotopes has a negligible impact with respect to the long-term availability of uranium worldwide.

The inventories of minerals used in the construction of power plants, as tabulated by the U.S. Census Bureau for 2000, 2008, and 2009, are shown in Table 19.6.3-1. The table also provides estimated inventories for 2010. Aluminum supplies have dropped since 2000 from 3,688,000 metric tons in 2000 to 1,727,000 metric tons in 2009 and have remained reasonably stable from 2009 to 2010. The supply of most other minerals has remained reasonably stable since 2000, with only minor fluctuations in availability during 2008 to 2010. The reasonably stable supply of minerals suggests that they will continue to be available for the foreseeable future in response to demand.

While a given quantity of material consumed during new facility construction and operation at the SHINE site is irretrievable, except for materials recycled during decommissioning, the impact on their availability is SMALL.

Table 19.6.3-1 United States Inventories for Minerals Used in Construction

Minerals	Year			
	2000	2008	2009	2010
Inventory in 1000 Metric Tons by Year				
Aluminum	3688	2658	1727	1720
Copper	1450	1310	1180	1120
Lead	449	399	406	385
Titanium	300	200	200	200
Zinc	796	748	710	699
Inventory in Million Metric Tons by Year				
Iron Ore	61	54	28	50
Portland Cement	84	83	62	61
Masonry Cement	4	3	2	2
Construction Sand and Gravel	1120	1040	844	760

Reference: US Census Bureau, 2012