



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Proposed Action Title:

Program or Field Office:

Location(s) (City/County/State):

Proposed Action Description:

Categorical Exclusion(s) Applied:

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer:

Date Determined:

**Attachment A: Projects in the ROSIE (FOA No. DE-FOA-0003117 and DE-FOA-0003118)  
Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
<b>Form Energy, Inc. (3117-1551)</b>	<b>Intensification of Continuous Alkaline Electrochemical Ironmaking with Net-Negative CO2 Emissions at Cost Parity with Pig Iron</b>	<b>A9, B3.6, B3.15</b>
Blue Origin (3117-1529)	Ouroboros: A Novel Reactor for Zero Emission Electrolytic Reduction of Iron	A9, B3.6
University of Utah (3117-1503)	Producing Clean Steel Directly from Iron Ore Concentrate	A9, B3.6, B3.15
University of Illinois, Urbana-Champaign (3117-1565)	High Efficiency, Solid State Microwave-Powered Hydrogen Plasmas for Use in Direct Reduction of Taconite Ore and Ore Concentrates in a Rotary Kiln Furnace	A9, B3.6, B3.15
University of Minnesota, Twin Cities	Ultrafast Hydrogen Microwave Plasma Reduction of Iron Ore	A9, B3.6, B3.15
Tufts University (3117-1509)	Solving Ore Concentrate Reduction with New Chemistry	A9, B3.6, B3.15
ElectraSteel, Inc. (3117-1527)	Low-Temperature Green Ironmaking from Unconventional Feedstocks	A9, B3.6
Georgia Institute of Technology (3117-1538)	Direct Hydrogen Reduction of Iron Ore Concentrate and Net-Shaped Fabrication of Linear Cellular Alloy Steels	A9, B3.6
Phoenix Tailings (3117-1541)	Novel Electrolytic, Zero Carbon Emission Direct Reduced Iron Production	A9, B3.6
University of Nevada, Las Vegas (3117-1544)	Fast Electrowinning via Rotors for Responsible Iron Creation (FERRIC)	A9, B3.6
Limelight Steel, Inc. (3118-1513)	Laser Furnace for Reduction of Iron Ore to Iron Metal	A9, B3.6
The Pennsylvania State University (3117-1517)	Multi-Cation Electrolytes for Electrolytic Reduction of Complex Iron Oxides at Low Temperatures	A9, B3.6

**Attachment A: Projects in the ROSIE (FOA No. DE-FOA-0003117 and DE-FOA-0003118)  
Program**

<b>Prime Recipient (Control No.)</b>	<b>Project Title</b>	<b>Categorical Exclusion</b>
Worcester Polytechnic Institute (3117-1501)	Low-Carbon Iron Production and High Silicon Steel Manufacturing (LCIPHSSM)	A9, B3.6, B3.15

**Worcester Polytechnic Institute (3117-1501)** Low-Carbon Iron Production and High Silicon Steel Manufacturing (LCIPHSSM) is the one project included in the Third Amended CX.



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program SBIR/STTR (FOA Nos. DE-FOA-0003117 and DE-FOA-0003118)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CO, GA, IL, IN, MA, MI, MN, NJ, NV, NY, OR, PA, TX, UT

Proposed Action Description:

SECOND AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original and First Amended Determinations, dated May 14, 2024 and June 12, 2024, respectively.) The Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program seeks to advance zero- process-emission ironmaking and ultra-low life cycle emissions steelmaking within two project categories (A and B). Specifically, the ROSIE program projects in Category A will describe a novel ironmaking process to produce an iron product; projects in Category B will describe a novel ironmaking process that ultimately produces a specific steel product; both categories will account for the impact a given technology will have on supply chain, production of a final steel product, and overall emissions. If successful, the ROSIE program will produce iron-based products from iron-containing ores and alternative feedstocks without process emissions in the ironmaking step, reducing fossil fuel combustion and greenhouse gas emissions. The ROSIE Program is composed of 13 small-scale research and development projects that will be conducted by universities, non-profit and for-profit entities, and small businesses. This Determination covers 5 of the 13 projects (see Attachment A for all 12 projects covered by this and the prior Determinations). These 5 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements. University of Minnesota has not obtained all necessary permits applicable to their proposed actions and is prohibited from commencing project work until those permits are obtained. Per the terms of the award, a permits certification and, if necessary, an amended NEPA Determination, are required prior to the commencement of applicable project work.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE  
Date: 2024.06.21 16:10:38 -04'00'

Date Determined:

**Attachment A: Projects in the ROSIE (FOA No. DE-FOA-0003117 and DE-FOA-0003118)  
Program**

<b>Prime Recipient (Control No.)</b>	<b>Project Title</b>	<b>Categorical Exclusion</b>
<b>Blue Origin (3117-1529)</b>	<b>Ouroboros: A Novel Reactor for Zero Emission Electrolytic Reduction of Iron</b>	<b>A9, B3.6</b>
<b>University of Utah (3117-1503)</b>	<b>Producing Clean Steel Directly from Iron Ore Concentrate</b>	<b>A9, B3.6, B3.15</b>
<b>University of Illinois, Urbana-Champaign (3117-1565)</b>	<b>High Efficiency, Solid State Microwave-Powered Hydrogen Plasmas for Use in Direct Reduction of Taconite Ore and Ore Concentrates in a Rotary Kiln Furnace</b>	<b>A9, B3.6, B3.15</b>
<b>University of Minnesota, Twin Cities</b>	<b>Ultrafast Hydrogen Microwave Plasma Reduction of Iron Ore</b>	<b>A9, B3.6, B3.15</b>
<b>Tufts University (3117-1509)</b>	<b>Solving Ore Concentrate Reduction with New Chemistry</b>	<b>A9, B3.6, B3.15</b>
ElectraSteel, Inc. (3117-1527)	Low-Temperature Green Ironmaking from Unconventional Feedstocks	A9, B3.6
Georgia Institute of Technology (3117-1538)	Direct Hydrogen Reduction of Iron Ore Concentrate and Net-Shaped Fabrication of Linear Cellular Alloy Steels	A9, B3.6
Phoenix Tailings (3117-1541)	Novel Electrolytic, Zero Carbon Emission Direct Reduced Iron Production	A9, B3.6
University of Nevada, Las Vegas (3117-1544)	Fast Electrowinning via Rotors for Responsible Iron Creation (FERRIC)	A9, B3.6
Limelight Steel, Inc. (3118-1513)	Laser Furnace for Reduction of Iron Ore to Iron Metal	A9, B3.6
The Pennsylvania State University (3117-1517)	Multi-Cation Electrolytes for Electrolytic Reduction of Complex Iron Oxides at Low Temperatures	A9, B3.6
Worcester Polytechnic Institute (3117-1501)	Low-Carbon Iron Production and High Silicon Steel Manufacturing (LCIPHSSM)	A9, B3.6, B3.15

**Bold text indicates the five projects included in the Second Amended CX.**



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program SBIR/STTR (FOA Nos. DE-FOA-0003117 and DE-FOA-0003118)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CO, GA, MA, MI, NV, NY, PA, TX

Proposed Action Description:

FIRST AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original Determination, dated May 14, 2024.) The Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program seeks to advance zero-process-emission ironmaking and ultra-low life cycle emissions steelmaking within two project categories (A and B). Specifically, the ROSIE program projects in Category A will describe a novel ironmaking process to produce an iron product; projects in Category B will describe a novel ironmaking process that ultimately produces a specific steel product; both categories will account for the impact a given technology will have on supply chain, production of a final steel product, and overall emissions. If successful, the ROSIE program will produce iron-based products from iron-containing ores and alternative feedstocks without process emissions in the ironmaking step, reducing the use of fossil fuel combustion and greenhouse gas emissions.

The ROSIE Program is composed of 13 small-scale research and development projects that will be conducted by universities, non-profit and for-profit entities, and small businesses. This Determination covers 5 of the 13 projects (see Attachment A for all 7 projects covered by this and the prior Determination). These 5 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE  
Date: 2024.06.12 09:28:38 -04'00'

Date Determined:

**Attachment A: Projects in the ROSIE (FOA No. DE-FOA-0003117 and DE-FOA-0003118)  
Program**

<b>Prime Recipient (Control No.)</b>	<b>Project Title</b>	<b>Categorical Exclusion</b>
<b>ElectraSteel, Inc. (3117-1527)</b>	<b>Low-Temperature Green Ironmaking from Unconventional Feedstocks</b>	<b>A9, B3.6</b>
<b>Georgia Institute of Technology (3117-1538)</b>	<b>Direct Hydrogen Reduction of Iron Ore Concentrate and Net- Shaped Fabrication of Linear Cellular Alloy Steels</b>	<b>A9, B3.6</b>
<b>Phoenix Tailings (3117-1541)</b>	<b>Novel Electrolytic, Zero Carbon Emission Direct Reduced Iron Production</b>	<b>A9, B3.6</b>
<b>University of Nevada, Las Vegas (3117-1544)</b>	<b>Fast Electrowinning via Rotors for Responsible Iron Creation (FERRIC)</b>	<b>A9, B3.6</b>
<b>Limelight Steel, Inc. (3118-1513)</b>	<b>Laser Furnace for Reduction of Iron Ore to Iron Metal</b>	<b>A9, B3.6</b>
The Pennsylvania State University (3117-1517)	Multi-Cation Electrolytes for Electrolytic Reduction of Complex Iron Oxides at Low Temperatures	A9, B3.6
Worcester Polytechnic Institute (3117-1501)	Low-Carbon Iron Production and High Silicon Steel Manufacturing (LCIPHSSM)	A9, B3.6, B3.15

**Bold text indicates the five projects included in the First Amended CX.**



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program SBIR/STTR (FOA Nos. DE-FOA-0003117 and DE-FOA-0003118)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Massachusetts, New York, Pennsylvania

Proposed Action Description:

The Revolutionizing Ore to Steel to Impact Emissions (ROSIE) Program seeks to advance zero-process-emission ironmaking and ultra-low life cycle emissions steelmaking within two project categories (A and B). Specifically, the ROSIE program projects in Category A will describe a novel ironmaking process to produce an iron product; projects in Category B will describe a novel ironmaking process that ultimately produces a specific steel product; both categories will account for the impact a given technology will have on supply chain, production of a final steel product, and overall emissions. If successful, the ROSIE program will produce iron-based products from iron-containing ores and alternative feedstocks without process emissions in the ironmaking step, reducing the use of fossil fuel combustion and greenhouse gas emissions.

The ROSIE Program is composed of 13 small-scale research and development projects that will be conducted by universities, non-profit and for-profit entities, and small businesses. This Determination covers 2 of the 13 projects (listed in Attachment A). All 2 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE  
Date: 2024.05.14 10:55:44 -04'00'

Date Determined:



**Attachment A: Projects in the ROSIE (FOA No. DE-FOA-0003117 and DE-FOA-0003118)  
Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
The Pennsylvania State University (3117-1517)	Multi-Cation Electrolytes for Electrolytic Reduction of Complex Iron Oxides at Low Temperatures	A9, B3.6
Worcester Polytechnic Institute (3117-1501)	Low-Carbon Iron Production and High Silicon Steel Manufacturing (LCIPHSSM)	A9, B3.6, B3.15