PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: University of North Dakota **STATE:** ND

PROJECT TITLE : Recovery Act: Electric Power Generaiton from Low to Intermediate Temperature Geothermal Resources

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000109	DE-EE0002854	GFO-10-207	0

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:
Description:

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

B5.1 Actions to conserve energy, demonstrate potential energy conservation, and promote energy-efficiency that do not increase the indoor concentrations of potentially harmful substances. These actions may involve financial and technical assistance to individuals (such as builders, owners, consultants, designers), organizations (such as utilities), and state and local governments. Covered actions include, but are not limited to: programmed lowering of thermostat settings, placement of timers on hot water heaters, installation of solar hot water systems, installation of efficient lighting, improvements in generator efficiency and appliance efficiency ratings, development of energy-efficient manufacturing or industrial practices, and small-scale conservation and renewable energy research and development and pilot projects. The actions could involve building renovations or new structures in commercial, residential, agricultural, or industrial sectors. These actions do not include rulemakings, standard-settings, or proposed DOE legislation.

B5.2 Modifications to oil, gas, and geothermal facility pump and piping configurations, manifolds, metering systems, and other instrumentation that would not change design process flow rates or affect permitted air emissions.

Rational for determination:

The University of North Dakota would demonstrate the technologic and economic feasibility of generating continuous electricity from non-conventional low temperature geothermal fluids using binary Organic Rankine Cycle (ORC) technology by installing an ORC electric power generating unit at a Continental Resources, Inc. (CRI) water flood site. The project would develop and disseminate a model that could be used to facilitate the installation of similar ORC systems in other oil and gas settings. The work would occur on the campus of the University of North Dakota in Grand Forks, North Dakota and at an existing CRI water flood site in the Cedar Hills oil field in Bowman County, North Dakota. An ORC (1 MW) would be installed in-line at the site. Fluids that would normally be directly re-injected back into the reservoir to maintain head pressure would first be run through the ORC to utilize latent heat to produce electricity before being re-injected into the reservoir. Fluids would only be re-routed not discharged. A bypass of the ORC would also be installed to guarantee flow rates for normal operation of the oil production facility. The bypass would allow the facility to function exactly as if the ORC had not been installed.
The project is divided into three phases with multiple tasks:
Phase A1 – Feasibility Study and Engineering Design
1. ORC System Design and Project Feasibility – A comparison of "off the shelf but fixed output" with "design to site conditions" machines would be done and a detailed design and cost analysis of the ORC system would be completed along with an economic model with actual costs to build the facility.
2. Regulatory and Environmental Permitting and Business Agreements – Water use permits and electrical interconnection options would be reviewed and negotiations for power purchase agreements would be initiated.
Phase A2 – Procurement, Installation, and Commissioning
3. Procurement and Installation – Using the design from Task 1, equipment would be procured and installed at the site using a local general contractor. A detailed project accounting system would be employed for more accurate cost data and replication at other sites.
4. ORC System Commissioning – ORC system components would be tested when delivered and installed on site when possible. Operational procedures would be reviewed and standard operating procedures developed by the project team.
Phase A3 – Operation and Maintenance (O&M)
5. General Operation and Systems Analysis – ORC system would operate 24 hours a day, 7 days a week. Off-site and on-site monitoring of the system would be performed. A bypass would be installed to guarantee flow rates for normal operation of the oil production facility.
6. System Validation – A report detailing the economic and technical performance and the operational characteristics

of the ORC system would be prepared and a business plan developed to determine the potential for replicating this project at other sites.
7. Project Management and Reporting
Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting checklist following the instructions included therein.
According to the R&D Laboratory Questionnaire, CRI has the required extraction and water right permits and no additional permits will be needed. There would be no liquid effluent handled or discharged, no hazardous waste would be used or generated, and no air pollutants would be created by the project. OSHA safety standards are maintained and CRI engineers monitor on-site safety. All personnel are required to wear personal protective equipment and the site is equipped with fire protection equipment.
This project is comprised of information gathering, data analysis, document preparation, actions to conserve energy through small-scale renewable energy research and development, and modification to piping at an existing oil production facility; therefore the DOE has categorized this proposal into Categorical Exclusions A9, B5.1 and B5.2.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____ Date: 3/23/10

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager

PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: University of North Dakota **STATE:** ND

PROJECT TITLE : Recovery Act: Electric Power Generation from Co-Produced Fluids from Oil and Gas Wells

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000109	DE-EE0002731	GFO-10-208	0

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

B5.1 Actions to conserve energy, demonstrate potential energy conservation, and promote energy-efficiency that do not increase the indoor concentrations of potentially harmful substances. These actions may involve financial and technical assistance to individuals (such as builders, owners, consultants, designers), organizations (such as utilities), and state and local governments. Covered actions include, but are not limited to: programmed lowering of thermostat settings, placement of timers on hot water heaters, installation of solar hot water systems, installation of efficient lighting, improvements in generator efficiency and appliance efficiency ratings, development of energy-efficient manufacturing or industrial practices, and small-scale conservation and renewable energy research and development and pilot projects. The actions could involve building renovations or new structures in commercial, residential, agricultural, or industrial sectors. These actions do not include rulemakings, standard-settings, or proposed DOE legislation.

B5.2 Modifications to oil, gas, and geothermal facility pump and piping configurations, manifolds, metering systems, and other instrumentation that would not change design process flow rates or affect permitted air emissions.

Rational for determination:

The University of North Dakota would demonstrate the technologic and economic feasibility of generating continuous electricity from coproduced non-conventional low temperature geothermal fluids using binary Organic Rankine Cycle (ORC) technology by installing an ORC electric power generating unit at an Encore Acquisition (EA) oil producing facility. The project would develop and disseminate a model that could be used to facilitate the installation of similar ORC systems in other oil and gas settings. The work would occur on the campus of the University of North Dakota in Grand Forks, North Dakota and at an existing operational EA oil production site on the Cedar Creek Anticline in Bowman County, North Dakota that has yet to be determined. An ORC (1 MW) would be installed in-line at the site. Fluids that would normally be directly re-injected back into the reservoir to maintain head pressure would first be run through the ORC to utilize latent heat to produce electricity before being re-injected into the reservoir. Fluids would only be re-routed not discharged. A bypass of the ORC would also be installed to guarantee flow rates for normal operation of the oil production facility. The bypass would allow the facility to function exactly as if the ORC had not been installed.

The project is divided into three phases with multiple tasks:

Phase A1 – Feasibility Study and Engineering Design

1. ORC System Design and Project Feasibility – A comparison of "off the shelf but fixed output" with "design to site conditions" machines would be done and a detailed design and cost analysis of the ORC system would be completed along with an economic model with actual costs to build the facility.
2. Regulatory and Environmental Permitting and Business Agreements – Water use permits and electrical interconnection options would be reviewed and negotiations for power purchase agreements would be initiated.

Phase A2 – Procurement, Installation, and Commissioning

3. Procurement and Installation – Using the design from Task 1, equipment would be procured and installed at the site using a local general contractor. A detailed project accounting system would be employed for more accurate cost data and replication at other sites.
4. ORC System Commissioning – ORC system components would be tested when delivered and installed on site when possible. Operational procedures would be reviewed and standard operating procedures developed by the project team.

Phase A3 – Operation and Maintenance (O&M)

5. General Operation and Systems Analysis – ORC system would operate 24 hours a day, 7 days a week. Off-site and on-site monitoring of the system would be performed. A bypass would be installed to guarantee flow rates for normal operation of the oil production facility.

6. System Validation – A report detailing the economic and technical performance and the operational characteristics of the ORC system would be prepared and a business plan developed to determine the potential for replicating this project at other sites.
7. Project Management and Reporting
Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting checklist following the instructions included therein.
According to the R&D Laboratory Questionnaire, EA has the required extraction and water right permits and no additional permits will be needed. There would be no liquid effluent handled or discharged, no hazardous waste would be used or generated, and no air pollutants would be created by the project. OSHA safety standards are maintained and EA engineers monitor on-site safety. All personnel are required to wear personal protective equipment and the site is equipped with fire protection equipment.
This project is comprised of information gathering, data analysis, document preparation, actions to conserve energy through small-scale renewable energy research and development, and modification to piping at an existing oil production facility; therefore the DOE has categorized this proposal into Categorical Exclusions A9, B5.1 and B5.2.

NEPA PROVISION

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Insert the following language in the award:

Note to Specialist :

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SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____ Date: 3/23/10

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

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☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
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BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager