



Department of Energy

Argonne Site Office
9800 South Cass Avenue
Argonne, Illinois 60439

SEP 02 2015

Dr. Peter B. Littlewood
Director, Argonne National Laboratory
President, UChicago Argonne, LLC
9700 South Cass Avenue
Argonne, IL 60439

Dear Dr. Littlewood:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION FOR
ARGONNE NATIONAL LABORATORY (ANL)

The Argonne Site Office (ASO) has approved the following as a categorical exclusion (CX) under Appendix B (to 10 CFR Part 1021, Subpart D, Integrated DOE NEPA Implementing Procedures, December 1996), Category B 3.1 "Site Characterization and Environmental Monitoring."

Waggle-Sidewalk---Lightweight Sensors for Urban Environments, ASO-CX-320

Therefore, no further NEPA review is required. However, if any modification or an expansion of the scope is made to the above project, additional NEPA review will be necessary.

Enclosed please find a copy of the approved Environmental Review Form (ERF) for the project. If you have any questions, please contact Kaushik Joshi of my staff at (630) 252-4226.

Sincerely,

A handwritten signature in black ink, reading "Joanna M. Livengood".

Joanna M. Livengood
Site Manager

Enclosure:
As Stated

cc: J. Stauber, ANL, w/encl.
R. Sankaran, ANL, w/encl.
D. Rodi, ANL, w/encl.
K. Joshi, ASO, w/encl.
M. McKown, SC-CH, w/encl.
P. Siebach, SC-CH, w/encl.



Environmental Review Form for Argonne National Laboratory

Project/Activity Title: Waggle-Sidewalk: Lightweight Sensors for Urban Environments

ASO NEPA Tracking No. _____ Type of Funding: _____

B&R Code _____

Identifying number: WFO 2015-15155 WFO proposal # 2015-15155 CRADA proposal # _____

Work Project # _____ ANL accounting # (item 3a in Field Work Proposal) _____

Other (explain) _____

Project Manager: Rajesh Sankaran Signature:  Date: Aug 06 2015

NEPA Owner: Diane J. Rodi Signature:  Date: 8/06/2015

ANL NEPA Reviewer: Joel V. Stauber Signature:  Date: 8/10/15

I. **Description of Proposed Action:** Argonne will construct sensor boards and embedded software for client, Citybridge LLC, on the Argonne site campus in a standard dry lab setting. The boards will include air sensors, light sensors, and chemical sensors (see Waggle Sensor Boards detailed description attached). Citybridge will install sensor boards into their existing utility system in New York City, NY. Argonne will provide field calibration of the pre-installed sensor boards in New York City, NY on city street locations at Citybridge hubs.

II. **Description of Affected Environment:** City streets of New York City, NY where Citybridge hubs already exist. Minimal environmental impact is expected.

III. **Potential Environmental Effects:** (Attach explanation for each "yes" response. See Instructions for Completing Environmental Review Form)

A. Complete Section A for all projects.

- 1. Project evaluated for Pollution Prevention and Waste Minimization opportunities and details provided under items 2, 4, 6, 7, 8, 16, and 20 below, as applicable Yes _____ No X
- 2. Air Pollutant Emissions Yes _____ No X
- 3. Noise Yes _____ No X
- 4. Chemical/Oil Storage/Use Yes _____ No X

5. Pesticide Use Yes No
6. Polychlorinated Biphenyls (PCBs) Yes No
7. Biohazards Yes No
8. Effluent/Wastewater (If yes, see question #12 and contact Gregg Kulma (FMS-SEP) at 2-9147 or gkulma@anl.gov) Yes No
9. Waste Management
- a) Construction or Demolition Waste Yes No
- b) Hazardous Waste Yes No
- c) Radioactive Mixed Waste Yes No
- d) Radioactive Waste Yes No
- e) PCB or Asbestos Waste Yes No
- f) Biological Waste Yes No
- g) No Path to Disposal Waste Yes No
- h) Nano-material Waste Yes No
10. Radiation Yes No
11. Threatened Violation of ES&H Regulations or Permit Requirements Yes No
12. New or Modified Federal or State Permits Yes No
13. Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste Yes No
14. Public Controversy Yes No
15. Historic Structures and Objects Yes No
16. Disturbance of Pre-existing Contamination Yes No
17. Energy Efficiency, Resource Conserving, and Sustainable Design Features Yes No

B. For projects that will occur outdoors, complete Section B as well as Section A.

18. Threatened or Endangered Species, Critical Habitats, and/or other Protected Species Yes _____ No X
19. Wetlands Yes _____ No X
20. Floodplain Yes _____ No X
21. Landscaping Yes _____ No X
22. Navigable Air Space Yes _____ No X
23. Clearing or Excavation Yes _____ No X
24. Archaeological Resources Yes _____ No X
25. Underground Injection Yes _____ No X
26. Underground Storage Tanks Yes _____ No X
27. Public Utilities or Services Yes X No _____

Citybridge LLC provides wifi and cellular networking to NYC residents. Citybridge will add sensor boards to existing hub structures on NYC streets.

28. Depletion of a Non-Renewable Resource Yes _____ No X

C. For projects occurring outside of ANL complete Section C as well as Sections A and B.

29. Prime, Unique, or Locally Important Farmland Yes _____ No X
30. Special Sources of Groundwater (such as sole source aquifer) Yes _____ No X
31. Coastal Zones Yes _____ No X
32. Areas with Special National Designations (such as National Forests, Parks, or Trails) Yes _____ No X
33. Action of a State Agency in a State with NEPA-type Law Yes _____ No X
34. Class I Air Quality Control Region Yes _____ No X

IV. Subpart D Determination: (to be completed by DOE/ASO)

Are there any extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal?

Yes _____ No X

Is the project connected to other actions with potentially significant impacts or related to other proposed action with cumulatively significant impacts? Yes ___ No X

If yes, is a categorical exclusion determination precluded by 40 CFR 1506.1 or 10 CFR 1021.211? Yes ___ No ___

Can the project or activity be categorically excluded from preparation of an Environment Assessment or Environmental Impact Statement under Subpart D of the DOE NEPA Regulations? Yes X No ___

If yes, indicate the class or classes of action from Appendix A or B of Subpart D under which the project may be excluded. Appendix B, B 3.1 Site characterization and environmental monitoring.

If no, indicate the NEPA recommendation and class(es) of action from Appendix C or D to Subpart D to Part 1021 of 10 CFR.

ASO NEPA Coordinator Review: Kaushik Joshi

Signature: K Joshi Date: 8-27-2015

ASO NCO Approval of CX Determination:

The preceding pages are a record of documentation that an action may be categorically excluded from further NEPA review under DOE NEPA Regulation 10 CFR Part 1021.400. I have determined that the proposed action meets the requirements for the Categorical Exclusion identified above.

Signature: Peter R. Siebach Date: 9/1/2015
Peter R. Siebach
Argonne Site Office NCO

ASO NCO EA or EIS Recommendation: Not applicable

Class of Action: _____

Signature: _____ Date: _____

Peter R. Siebach
Argonne Site Office NCO

Concurrence with EA or EIS Recommendation: *Not applicable*

CH GLD: _____

Signature: _____

Date: _____

ASO Manager Approval of EA or EIS Recommendation: *Not applicable*

An EA EIS shall be prepared for the proposed _____ and

_____ shall serve as the document manager.

Signature: _____

Date: _____

Dr. Joanna M. Livengood
Manager

Waggle Sensor Boards

The Waggle Prototype Sensor boards are a collection of 3 electronic circuit boards – AirSense Board, ChemSense Board and LightSense Board. The boards are populated with several sensors capturing the physical and chemical attributes of the urban environment. The AirSense Board carries the microcontroller circuits, and interfaces with the other boards to acquire sensor data. The AirSense and ChemSense boards are one unit, and to be placed in a cavity with ambient airflow, and the LightSense board should be placed in a protective cavity safe from exposure to external air and humidity. The protective cavity has to provide appropriate transparent windows for the sensors to capture ambient light of various frequencies from far UV to near-IR (250-1200nm wavelength). The specifications of the boards are as follows –

AirSense Board:

Interface to City Bridge Link – I2C (5V logic) using RJ-45 Connector.

Power – 5-6 V DC, 500 mA. The power will be fed using the RJ-45.

Dimensions – 2.2 in x 5.7 in x 1 in (at the thickest point).

Internal Interfaces (wiring harness up to LightSense Board) – I2C (5V logic) using RJ-45 Connector

Sensors –

AirSense Board

Sensor Name	Parameter Measured
TMP112	Temperature, -40 to +125C
HTU21D	RH, 0 to 100%, Temperature, -40 to +125C
GP2Y1010AU0F	Dust Density, 0 - 0.5 mg/m ³
BMP180	Pressure, 300 - 1100 hPa, Temperature, -40 to +85C
PR103J2	Temperature, -55 to +80C
TSL250RD	Visible Light Intensity 400-950nm
MMA8452Q	3 axis acceleration ±8 g, RMS vibration
SPV1840LR5H-B	Sound Pressure, 0 to 123 dB, -38dBV/Pa
TSYS01	Temperature, -5° to +50°C

LightSense Board:

Interface to External Computer – None.

Power – 5-6 V DC, 150 mA. Power supplied via RJ-45 wiring harness cable from AirSense board.

Dimensions – 1.25 in x 3.25 in x 1.2 in (at the thickest point).

Internal Interfaces – I2C (5V logic) using RJ-45 Connector (wiring harness down to AirSense Board).

Sensors –

LightSense Board

Sensor Name	Parameter Measured
HMC5883L	Magnetic Field Strength, -8 to +8 Gauss
HIH6130	Temperature, -25 to +85 C, RH, 0-100%
APDS-9006-020	Ambient Light Level, 475-650nm
TSL260RD	Near IR Level 830--1100 nm
TSL250RD	Visible Light Level 400-950nm
MLX75305	Ambient Light Level, 400 - 1000 nm
ML8511	UV Light Level, 280-400 nm
D6T	Temperature, 5 to 50C
MLX90614	Temperature, -70 to +380 C
TMP421	Temperature, -40 to +125C
SPV1840LR5H-B	Sound Pressure, 0 to 123 dB, -38dBV/Pa

ChemSense Board:

Interface to External Computer – None.

Power – 5 V DC, 150 mA. The power will be fed by a 2 wire cable from AirSense board.

Dimensions – 2.2 in x 5 in x 1 in (at the thickest point).

Internal Interfaces – RS-232 (3.3V logic) using 2 pin header for interfacing with AirSense board.

Sensors –

ChemSense Board

Sensor Name	Parameter Measured
Total reducing gases	Concentration
Ethanol (C ₂ H ₅ -OH)	Concentration in ppm
Nitrogen Dioxide (NO ₂)	Concentration in ppm
Ozone (O ₃)	Concentration in ppm
Hydrogen Sulphide (H ₂ S)	Concentration in ppm
Total Oxidizing gases	Concentration
Carbon Monoxide (CO)	Concentration in ppm

Sulfur Dioxide (SO2)	Concentration in ppm
Temperature and Humidity	Temp, -25 to +85 C, RH, 0-100%
Pressure Sensor	Pressure, 300 - 1100 hPa

Installation:

Argonne will provide 3 circuit boards – one of each AirSense, ChemSense and LightSense. Additionally a short length wiring harness that connects AirSense and ChemSense will accompany the three boards, fulfilling the set for an installation. Link.nyc will provide and install a Cat5 Ethernet cable for connection between AirSense and LightSense boards (max 2m run) and provide a 4 wire interconnect between the City Bridge Link and the AirSense board. Figure below illustrates the connections.

