

# DOE-ID NEPA X DETERMINATION

## Idaho National Laboratory

**SECTION A. Project Title:** London Fog Testing at Idaho National Laboratory

**SECTION B. Project Description and Purpose:**

New technologies are needed for detecting harmful radiological agents in support of Armed Forces, Homeland Defense, and first responder efforts to respond to terrorist and other threats. Research and development (R&D) of stand-off detection methods is essential for responding to and defeating these threats. The purpose of the proposed action is to provide data regarding new technologies for stand-off detection. The proposed action would conduct field testing of short and long range detection equipment to evaluate the capture efficiency of stand-off detection devices.

### Background

Advancements in detection capabilities for ultra-low level chemicals have made possible the use of a suite of systems designed to identify source terms for a variety of defense applications. The Passive Persistent Sensing (PPS) technology can be broken down into two distinct categories, long range and short range. The long range capability utilizes stationary London Fog Air Collectors (LFACs) which have detection limits below parts per trillion (ppt). Using mobile detection systems, the short range capability exploits the information obtained from the long range capability and further refines the source term location.

### Workscope

The goals of the London Fog tests are to conduct, under specified meteorological conditions, a complete evaluation of long range detection capabilities at various distances and to evaluate test data for use in determining capture efficiency. Detectors would be tested using radioactive  $^{14}\text{C}$ -labeled methane ( $^{14}\text{CH}_4$ ) and/or labeled tetrafluoromethane ( $^{14}\text{CF}_4$ ). Test gases would be released and monitored as they flow down wind.

Under the proposed action, long range release field testing (approximately 100 km) would occur at Idaho National Laboratory (INL). Testing would consist of approximately 4-6 releases of  $^{14}\text{CH}_4$  with concentrations ranging from 20 to 300 mCi. The total of all  $^{14}\text{CH}_4$  releases will not exceed 1055 mCi. Methane or tetrafluoromethane labeled with  $^{14}\text{C}$  would be shipped, under Nuclear Regulatory Commission (NRC) license, to INL and stored in an approved INL radiological storage area located at the Critical Infrastructure Test Range Complex (CITRC). Management at INL would be under NRC license or Department of Energy (DOE) authority.

Potential release sites are under evaluation but include locations within the southern INL boundary or well within the INL Site boundaries. The nominal release height at each release point is 3 meters. Travel to release sites would be limited to existing roads. In general, all LFACs would be located off site to allow suitable distances from the release area. However, some LFACs may be positioned around the INL complex to obtain background readings prior to and during testing. LFACs are relatively small systems and would operate under commercial power when available. Self-contained LFACs would be staged in towable trailers equipped with portable electrical generators. Detection units would be placed at least 100 km from the release point (outside INL boundaries), and would likely be located on private, government and state property. Approval from State or other Federal agencies would be obtained, if required. Samples would be shipped by the customer to a non-INL laboratory for analysis.

$^{14}\text{C}$ -labeled gases are low level radiation beta emitters that occur naturally in the environment.  $^{14}\text{C}$  is naturally produced in the atmosphere at about 1 part per trillion (PPT) and has a half-life of 5,730 years.  $^{14}\text{N}$  occurs naturally in the atmosphere, and as sunlight and solar energy pass through  $^{14}\text{N}$ , it becomes  $^{14}\text{C}$ . As the  $^{14}\text{C}$  loses energy through beta decay, it returns to  $^{14}\text{N}$ . Beta particles are relatively low energy particles and can be shielded by a single sheet of aluminum foil. The maximum distance traveled by beta particles is 22 cm (<10 inches) in air, and within 30 minutes,  $^{14}\text{C}$ -labeled gases dissipate to background levels or below.  $^{14}\text{C}$  would decay to background levels before penetrating soil, and  $^{14}\text{C}$ -labeled material is not listed as a hazardous air pollutant under the Clean Air Act (CAA).

A Gaussian plume model was performed for a 300 mCi release of  $^{14}\text{C}$ . A broad range of possible meteorological conditions (wind speed and stability class) for daytime hours was analyzed to determine the conditions that would produce the maximum dose. The results indicate that at 100 m the maximum potential dose is 0.002 mrem. This is 5000 times less than the 10 mrem/yr standard for public exposure. As expected, the dose decreases with distance beyond 100 m. It should be noted that the Gaussian plume model utilized for this analysis is an appropriate model for distances greater than 100 m. Thus the doses calculated are for 100 m and beyond. The nearest receptor at the northeast INL boundary (project required wind direction) would be 70km from the release point. The potential dose to the public at 70 km is conservatively estimated to be about 5.3E-5 mrem.

For comparison, the 2014 estimated dose equivalent (the most recent year available) from all INL Site operations to the offsite maximally exposed individual located 7,976 m (the nearest receptor) from the INL Site boundary was 0.0365 mrem/year.

Adherence to appropriate environmental documents, test plans, safety plans, Safety Data Sheets (SDS), Department of Energy (DOE) regulations, and State and Federal law during test operations would 1) not threaten a violation of applicable statutory, regulatory, or permit requirements; 2) not require expansion of waste storage, disposal, recovery, or treatment facilities; 3) not disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that preexist in the environment that would result in an uncontrolled or unpermitted release; 4) not have the potential to cause significant impacts on environmentally sensitive resources, e.g., historic properties; state or federally listed sensitive, threatened, endangered, or candidate species; floodplains and wetlands; areas having special designation, e.g., designated wilderness, national parks, national monuments, etc.; and 5) not involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds or invasive species. Additionally, there are no extraordinary circumstances related to the proposed action that would affect the significance of the environmental effects of the proposal.

The time frame for this work is July-October 2016. The period where releases may occur is expected to span 4-6 weeks.

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**SECTION C. Environmental Aspects or Potential Sources of Impact:**

**Air Emissions**

This work would generate non-regulated air emissions from small mobile generators in place for several weeks. A maximum of 1.055 Ci of radioactive <sup>14</sup>C would be released to the atmosphere as part of 316 mg of methane gas, a greenhouse gas. The release of <sup>14</sup>C will be reported as part of the annual Radioactive National Emission Standards for Hazardous Air Pollutants (NESHAPS) Report. The estimated dose to the maximally exposed member of the public from the <sup>14</sup>C will be less than 0.1 mrem/yr; no PTC will be required.

Project activities have the potential to generate fugitive dust.

**Disturbing Cultural or Biological Resources**

Vehicles at the release point and detection trailers will be parked on 2-tracks or on grassy areas, avoiding damage to vegetation such as sagebrush.

Breeding bird surveys may be required.

Release of up to 1.055 Ci of <sup>14</sup>C is not expected to have any measureable affect on flora or fauna.

Cultural resources could be impacted if detectors are placed in undisturbed areas.

**Generating and Managing Waste**

This work is expected to generate small amounts of common trash and radioactive Low Level Waste. All Solid Waste associated with material release and detection will be managed at the INL through Waste Generator Services (WGS). Analytical waste will be managed by the off-site laboratory performing the analysis.

**Releasing Contaminants**

The release of <sup>14</sup>C has potential to release contaminants. However, these atmospheric releases of methane labeled with <sup>14</sup>C would quickly be diluted to atmospheric background levels before being deposited to soil or water.

**Using, Reusing, and Conserving Natural Resources**

Greenhouse gas emissions would consist of a total of about 316 mg (about 395 ml) of methane gas.

**SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification:** Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

For Categorical Exclusions (CXs), the proposed action must not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, 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 or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not "connected" to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

**References:** 10 CFR 1021, Appendix B to subpart D, items B3.6, "Small-scale research and development, laboratory operations, and pilot projects"

**Justification:** Project activities are consistent with 10 CFR 1021, Appendix B, B3.6, "Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment."

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act)

Yes  No