

ENVIRONMENTAL CHECKLIST IDAHO NATIONAL LABORATORY

SECTION A. Project Title: Characterization of Fluidized Beds via Pressure Fluctuation Analysis

SECTION B. Project Description:

The purpose of this work is to conduct research using pressure as a measure of performance for fluidized beds (spouted, bubbling, or slugging) at the Center for Advanced Energy Studies (CAES).

The approach to this research activity consists of two main tasks:

1. Sieving the bed media with a motorized sieve shaker - sintered aluminosilicate spheres (used in the petroleum industry as a proppant to hold fractures open when the rock formation has been hydro-fractured) and assorted seeds (mustard, canola, sorghum, etc.). The aluminosilicate spheres have very little dust potential. Some of the aluminosilicates may have free silica present (as indicated on the MSDS).
2. Collecting and analyzing pressure data from the fluidized bed models. A variety of bed media will be used over a range of particle densities, particle diameters, gas densities, gas viscosities, gas temperatures, and physical configurations of the "retort" or models.

Activities are approved in this document for normal operating conditions per the manufacturers' instructions. Normal operating conditions may utilize the following gases: air, nitrogen, helium, argon, or hydrogen to fluidize the bed media. Air will only be used at or near room temperature. The other gases will be used over a range of temperatures from ambient to 1500°C. Hydrogen will only be used in the furnace which is equipped with a combustible gas safety system (with flare) to ensure that combustible gases do not accumulate in the work space. The hydrogen gas supply and lines will be bonded, grounded, and provided with a pressure relief valve that discharges to the gas flare or fume hood exhaust.

The furnace is enclosed in an insulated and water-cooled enclosure, so the only potential exposure to hot surfaces is the exhaust tubing and the combustible gas flare. The bed discharge terminates in a quartz thimble that is within an acrylic enclosure.

The furnace will have been evacuated with a vacuum pump and backfilled with an inert gas to remove oxygen and water vapor from within the furnace enclosure before the bed media is fluidized at elevated temperatures.

A combustible gas flare system will be used to combust hydrogen gas (when used) as it exits the furnace or as discharged from the hydrogen line pressure relief valve to prevent uncontrolled accumulation or ignition of hydrogen within the laboratory.

Maintenance on the furnace and vacuum pump may include replacing seals, changing vacuum pump lubricant, and replacement of the graphite retort tube and graphite heating element.

This work may continue through 2012.

SECTION C. Environmental Aspects / Potential Sources of Impact:

Air Emissions - Inert gases such as Ar, and N may be emitted as well as H and it's combustion gases. These gases are not regulated.

Generating and Managing Waste - Small amounts of industrial waste, including PPE and expended bed material, are expected. All waste will be managed by CAES/Idaho State University. Non-contact cooling water will be discharged to the Idaho Falls sewer system under CAES authority.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: 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, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment 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) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not "connected" nor "related" (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

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References: 10 CFR 1021, Appendix B to Subpart D, B3.6

Justification: This is a small-scale research project that will be conducted by INL research personnel. All work can be covered under CX category B3.6
"...small scale research and development projects..."

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on: 3/11/10