

**NANOMATERIALS SAFETY
IMPLEMENTATION PLAN**

Comments and questions regarding this plan should be directed to the contact person listed below:

Name: Jim Withers
Industrial Hygienist
Address: G40 TASF
Phone: 294-4743

Sign-off Record:

Approved by: _____ **Date:** _____
Manager, Environment, Safety, Health & Assurance

Approved by: _____ **Date:** _____
Deputy Director

Approved by: _____ **Date:** _____
Director

1.0 REVISION/REVIEW LOG

Environment, Safety, Health & Assurance (ESH&A) will review this document once every two years at a minimum:

<u>Revision Number</u>	<u>Effective Date</u>	<u>Contact Person</u>	<u>Pages Affected</u>	<u>Description of Revision</u>
0	4/15/08	J. Withers	All	Initial Issue

2.0 PURPOSE AND SCOPE

Ames Laboratory has limited activities involving nanomaterials. Potential hazards associated with nanomaterials work are addressed through the *Readiness Review* process, which provides the identification and evaluation of potential hazards and establishes effective control mechanisms to ensure protection of the employee and the environment. To date, hazards associated with projects involving nanomaterials have been determined to be amenable to conventional controls such as ventilation and use of personal protective equipment. The Laboratory recognizes that nanotechnology is an emerging field and that many of the associated ES&H concerns related to work with these materials are still being investigated. Ames Laboratory safety professionals monitor professional sources of information to identify new control strategies associated with nanomaterials research.

The DOE Policy 456.1, Statement of Nanoscale Safety, is part of the DOE-ISU contract for operation of Ames Laboratory. Specifically, DOE P 456.1 delineates the following expectations:

- 1) Adoption of “Best Practices” and Standards
- 2) Identification and Management of EH&S Hazards
- 3) Integration of New Research Findings Pertaining to Nanoscale Safety
- 4) Supporting the Resolution of ES&H Concerns

The following information outlines the Laboratory’s implementation of DOE P 456.1 for Ames Laboratory and more specifically how the above expectations are met.

3.0 RESPONSIBILITIES

3.1 LABORATORY DIRECTOR – The Laboratory Director is ultimately responsible for ensuring compliance with DOE P 456.1 and assuring that the Laboratory’s environment, safety and health programs adequately the hazards associated with use of nanomaterials. The Director delegates this responsibility down through the line management structure of the Laboratory.

3.2 PROGRAM DIRECTORS / DEPARTMENT MANAGERS – Program Directors / Department Managers are responsible for ensuring that all research with nanomaterials conducted within

the program is done in accordance with established policies and procedures. Program Directors/Department Managers delegate this responsibility down through the line management structure of the Program.

- 3.3 **GROUP / SECTION LEADERS** – Group / Section Leaders are responsible for ensuring that all research with nanomaterials within their group is conducted in accordance with established policies and procedures as described later in this document. Responsibilities include participation in the Readiness Review process, day-to-day management of laboratory activities, ensuring that laboratory personnel are trained and feel empowered to report unsafe work conditions or other safety concerns related to work with nanomaterials.
- 3.4 **EMPLOYEES** – Ames Laboratory employees are required to work with nanomaterials in accordance with established policies and procedures. Employees shall interact with supervisory personnel, Safety Coordinators / Representatives and ESH&A personnel on concerns and issues that relate to work with nanomaterials.
- 3.5 **ENVIRONMENT, SAFETY, HEALTH and ASSURANCE** – The ESH&A office shall assist research staff on the effective implementation of nanomaterials safety programs that ensure protection of the worker and environment. ESH&A staff will stay current on environment, safety and health best practices as they relate to nanomaterials and communicate that information to research staff.

4.0 PROGRAM ELEMENTS

4.1 REFERENCES & STANDARDS

Ames Laboratory recognizes that information on the safe use of nanomaterials is constantly being updated. Literature published by organizations such as the National Institute for Occupational Safety and Health (NIOSH), the American Industrial Hygiene Association (AIHA), the National Research Council, the American Chemical Society and the International Council on Nanotechnology and other organizations will be evaluated by ESH&A personnel and communicated to research staff as deemed appropriate. As of this writing, the Laboratory's program is based on the following publication: *Department of Energy Nanoscale Science Research Centers - Approach to Nanomaterial ES&H - Revision 2 – June 2007*.

4.2 IDENTIFICATION & MANAGEMENT OF NANOMATERIAL HAZARDS

4.2.1 Proposal Review

ESH&A personnel review all funding requests. Proposals with nanomaterials work are closely scrutinized for assurance that the work does not fall outside of the “safety envelope” established during Readiness Review (see below). Any identified concerns are communicated to research staff and followed up if funding is received.

4.2.2 Readiness Review

Nanoscale work is identified via Readiness Review (Procedure #10200.006). Specifically, the physical hazard of nanomaterials is addressed on the ES&H Hazard Identification Checklist by the following statements:

Section A – Chemical and Biological Concerns:

A10 Activities that generate potentially hazardous ambient air concentrations of nanoscale and other particulates, mists, fumes, vapors, or asphyxiates.

Section D – Environmental Concerns:

D2 Potential for release of chemical, physical, or radiological agents (nanoscale and other particulates, fumes, mists, vapors, vapors) via a fume hood or exhaust system.

4.2.3 Training

Laboratory personnel identify work with nanomaterials via completion of a Training Needs Questionnaire (TNQ). The TNQ question on nanomaterials work is as follows:

“Do you work with nanoscale materials (particles with diameters less than 100 nanometers)?”

If answered “yes”, the employee’s training profile is updated and reflects the need for completion of the Lab’s nanomaterials safety module entitled “Nanotechnology Awareness (AL-208)”. This course is computer-based, takes 30 minutes to complete and requires an 80% or higher score on a Learning Assessment Tool.

4.3 INTEGRATION OF NEW RESEARCH FINDINGS PERTAINING TO NANOSCALE MATERIALS

ESH&A personnel stay abreast of the latest developments in the safe use of nanomaterials through a variety of external and internal mechanisms:

External sources of information include participation in professional development conferences/meeting sponsored by the American Academy of Industrial Hygiene (Professional Conference of Industrial Hygiene), the American Conference of Governmental Industrial Hygienists (American Industrial Hygiene Conference & Exposition), DOE (Nanotechnology Centers-sponsored courses) and academia (Iowa State University). Internal sources of information include proposal reviews, Readiness Review, independent walkthroughs and interactions with researchers during training.

Information gleaned from these sources is utilized to bring about improvements in the way the Laboratory anticipates, recognizes, evaluates and controls hazards associated with nanomaterials. These improvements include enhanced training and the development of more effective hazard assessment and control strategies.

4.4. SUPPORTING THE RESOLUTION OF ES&H CONCERNS

Ames Laboratory has an effective contractor assurance program that provides immediate feedback on the adequacy of the ES&H program. Feedback on the efficacy on the methods in place for anticipating, recognizing, evaluating and controlling hazards of nanomaterials work is received via a variety of mechanisms including independent walkthroughs, the employee concern program, Readiness Review (5-year reviews), annual topical appraisals, internal reviews conducted by the Laboratory's Independent Auditor and external reviews conducted by DOE and the Inspector General.

5.0 IMPLEMENTATION DATES

Ames Laboratory has updated its overall ES&H program to more effectively address hazards associated with nanomaterials. Action items are listed below in three main categories: Program Documentation, Training, Assessments:

Program Documentation:

- 1) Industrial Hygiene Program Manual updated to include section on nanomaterials
Completion Date: 11/1/07
- 2) Environment, Safety, Health & Assurance Manual updated to include section on nano materials
Completion Date: 6/1/08

Training

- 1) ESH&A participation in webinar on nanomaterials safety sponsored by American Industrial Hygiene Association
Completion Date: 3/8/07
- 2) ESH&A participation in University of Wisconsin-sponsored course on nanomaterials safety
Completion Date: 5/21/07
- 3) ESH&A participation in nanomaterials training at Professional Conference on Industrial Hygiene
Completion Date: 11/1/07
- 4) Development of site-wide, web-based nanomaterials safety module
Completion Date: 12/31/07
- 5) Training of Ames Laboratory ES&H professionals and select research staff
Completion Date: 2/15/08
- 6) ESH&A participation in nanomaterials safety lectures at American Conference of Governmental Industrial Hygienists conference
Completion Date: 6/6/08

Assessments

- 1) DOE Inspector's General audit of Laboratory's program
Completion Date: 2/26/07
- 2) Ames Laboratory Internal Audit of nanomaterials safety program
Completion Date: 10/1/08