THE Ames Laboratory

SCIENTIFIC STRATEGIC PLAN

FY2010 - FY2014

Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

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Scientific Strategic Plan

This document describes the Ames Laboratory's 5-year plan for science and technology. Comments and questions regarding this plan should be directed to the contact person listed below:

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Sign-off Record:

Approved by: _____ Date: _____
Dr. Cynthia J. Jenks, Assistant Director for Scientific Planning

Reviewed by: _____ Date: _____
Tom E. Wessels, Manager, Environment, Safety, Health and Assurance

Approved by: _____ Date: _____
Dr. Alexander H. King, Director

Note: The original document sign-off record with signatures is on file with ESH&A.

1.0 REVISION/REVIEW LOG

The Assistant Director for Scientific Planning will formally review this document at least every three years.

Revision Number	Effective Date	Contact Person	Pages Affected	Description of Revision
0	10/01/09	C. Jenks	All	Initial Issue

Vision

The Ames Laboratory will be our Nation's premier research institute in critical areas of condensed matter science, its related technologies, and the strategic applications of advanced materials.

Mission

The Ames Laboratory creates materials,
inspires minds to solve problems,
and addresses global challenges.

Introduction

This plan maps new directions for science and technology at the U.S. Department of Energy's (DOE) Ames Laboratory. While enhancing our existing world-class research we will move into new research areas to meet the many new challenges facing our nation and our world. Our vision and goals are guided by our core values of excellence, community, agility, safety, inspiration, innovation, and collaboration.

The Ames Laboratory is one of DOE's ten Office of Science National Laboratories. The Ames Laboratory is operated for the U.S. DOE by Iowa State University of Science and Technology (ISU) and is located on the campus of the university, in Ames, Iowa. We excel at interdisciplinary materials research, with strengths in materials science & engineering, chemistry, physics, and computational sciences. As a National Laboratory we take seriously our responsibility to serve the Nation and contribute to the Department of Energy's mission. We will advance the national, economic, and energy security of the United States and we will promote scientific and technological innovation in support of that mission.

The hallmarks of work at a National Laboratory, as established by the National Laboratory Directors' Council, include the following:

- It is mission driven.
- It addresses science of scale.
- It involves multidisciplinary research teams.
- It provides distinctive, powerful research facilities.
- It is responsive to technological surprise.
- It is conducted in a safe and secure operating environment.

All of the National Laboratories are distinct in character. The Ames Laboratory claims the following distinguishing characteristics:

1. Highly successful technology transfer
2. Best in class safety culture
3. Strong interactions with university researchers

This scientific strategic plan seeks to capitalize on the benefits of our close relationship with the university to deliver a distinctive National Laboratory research program. The Laboratory finds both benefits and challenges in fulfilling the role of a national laboratory arising from its unique level of integration with a university campus.

The benefits include

- Access to collaborators across a wide range of disciplines
- Access to excellent undergraduate and graduate students
- Joint appointments with ISU
- Collaborative hiring, especially in dual career cases
- Efficiency through shared infrastructure and services
- Cross-access to facilities, which strengthens both ISU and the Ames Laboratory
- Shared opportunities to bring developed technology to market
- Shared commitment to workforce development

The challenges include

- Attracting world-class researchers who prefer a team-oriented research as opposed to the single investigator style most often found at universities.
- Keeping the cost of doing business of the Laboratory comparable to ISU so as to encourage new funding opportunities to be pursued through the scientifically most appropriate institution. Jointly appointed staff can funnel research support through ISU or the Laboratory.
- Reducing the confusion, errors and redundancy between ISU and the Ames Laboratory, brought about by differing regulations and bureaucracies.

This plan provides five distinct goals for the Ames Laboratory:

Goal 1: Initiate and sustain world-leading scientific and engineering programs in areas consistent with our vision and the mission of DOE and other clients.

Goal 2: Operate and maintain scientific equipment and facilities that serve as national resources and achieve our vision.

Goal 3: Cultivate scientific and engineering talent in areas critical to our vision.

Goal 4: Foster an environment that is conducive to creative and collaborative research.

Goal 5: Conduct research in a safe and secure manner to protect our employees and our environment.

These goals and their associated objectives recognize our scientific potential to be the world-leaders in

(1) solid-state materials discovery, synthesis, and design
(2) catalysis
(3) advanced analytical instrumentation
(4) forensic science
(5) technology transfer

Once approved, this plan will be integrated with the Ames Laboratory Operations Strategic Plan to provide an overarching strategic plan for the Laboratory.

Goal 1: Initiate and sustain world-leading scientific and engineering programs in areas consistent with our vision and the mission of DOE and other clients.

Objectives	Metrics	Responsible Person
1.1 Attain the world-leading experimental, theoretical and computational research program and reputation in the discovery, design, synthesis, understanding and control of novel, sustainable materials.		Chief Research Officer
	Number of publications in high quality journals in this area.	
	Research funding in this area.	
	Number of invited talks, review articles, and participants in panels in this area.	
	Number of overall citations and number of citations in review articles.	
	Number of patents and licenses in these areas.	
1.2 Advance a world-leading research program and reputation in catalysis.		Lin
	Number of publications in high quality journals in this area.	
	Research funding in this area.	
	Number of invited talks, review articles, and participants in panels in this area.	
	Number of overall citations and number of citations in review articles.	
	Number of patents and licenses in these areas.	

Objectives	Metrics	Responsible Person
1.3 Conduct world-leading research in biofuels and biorenewables.		Lin
	Number of publications in high quality journals in these areas.	
	Research funding in these areas.	
	Number of invited talks, review articles, and participants in panels in these areas.	
	Number of overall citations and number of citations in review articles.	
	Number of patents and licenses in these areas.	
1.4 Perform world-leading research utilizing and developing advanced characterization capabilities especially (1) angle-resolved photoemission, (2) neutron and x-ray scattering, (3) solid-state NMR, (4) ultrasensitive chemical and structural analysis, and (5) ultraprecise frequency measurements.		Chief Research Officer
	Number of publications in high quality journals in these areas.	
	Research funding in these areas.	
	Number of invited talks, review articles, and participants in panels in these areas.	
	Number of overall citations and number of citations in review articles.	
	Number of patents and licenses in these areas.	

Objectives	Metrics	Responsible Person
1.5 Establish world-leading research programs and reputation in the design and development of materials for energy-related applications including: (1) energy-efficient processes and technologies; (2) energy generation; and (3) energy storage.		Chief Research Officer
	Number of publications in high quality journals in these areas.	
	Research funding in these areas.	
	Number of invited talks, review articles, and participants in panels in these areas.	
	Number of overall citations and number of citations in review articles.	
	Number of patents and licenses in these areas.	
1.6 Lead a national research effort into existing forensic methods of visual examination, to develop the next generation of scientific quantitative visual examination techniques (e.g. for fingerprints, firearms, toolmarks, and fracture matching).		Baldwin
	Number of publications in high quality journals in this area.	
	Number of effort-related techniques in use and validated.	
	Number of invited talks and review articles in this area.	
	Number of patents and licenses in this area.	

Goal 2: Operate and maintain scientific equipment and facilities that serve as national resources and achieve our vision.

Objectives	Metrics	Responsible Person
2.1 Build the most comprehensive national resource for innovative materials discovery, design, synthesis, scalable processing and control of novel bulk and nano-structured materials. (related to objective 1.1)		Chief Research Officer
	Number of visiting researchers.	
	Number of publications.	
	Number of students and researchers trained or attend workshops at Ames Laboratory.	
	Number of invited talks and participants in panels in this area.	
	Number of groups or organizations receiving samples.	
2.2 Establish a national resource for chemical imaging with high spatial and temporal resolution. (related to objective 1.4)		Lin
	Penetration into new fields and disciplines as evident by publications by us and others.	
	Number of students and researchers trained.	
	Achieve nm resolution concurrent with picosecond temporal resolution.	
	Number of collaborators.	
2.3 Develop the world's best solid-state NMR capabilities. (related to objective 1.4)		Chief Research Officer
	Number of citations.	
	Number of people taught.	
	Number of visiting researchers.	
	Number of invited talks.	

Objectives	Metrics	Responsible Person
2.4 Develop a national facility that brings together the various disciplines necessary to move the state of forensic science forward in the area of visualization. (related to objective 1.5)		Baldwin
	Facilities developed.	
	Number of external users.	
2.5 Create a national resource for the conversion of biological feedstocks to portable fuel using specifically designed catalysts. (related to objectives 1.2 and 1.3)		Lin
	Number of collaborators.	
	Number of citations.	
2.6 Lead a national network that helps bring new energy technologies out of labs and into the private sector.		Covey
	New building plan developed.	
	Number of external users of facilities for this purpose.	

Goal 3: Cultivate scientific and engineering talent in areas critical to our vision.

Objectives	Metrics	Responsible Person
3.1 Increase visibility of researchers.		Jenks
	Citations of scientific staff.	
	Invited talks.	
	Society fellowships and awards.	
3.2 Increase visibility and quality of postdoctoral program.		Jenks
	Quality of placements upon completion of postdoctoral appointment.	
	Number of applicants or inquiries for posted postdoc positions.	
	Quality of postdocs' publications prior to hiring.	
3.3 Increase research capacity by 50%.		Chief Research Officer
	Number of FTE faculty, scientists, postdocs and graduate students.	
3.4 Create 50% more opportunities for excellent graduate and undergraduate students to participate in research.		Jenks
	Number of such students funded to conduct research.	
3.5 Enhance managerial skills and leadership capacity of workforce.		Jenks
	Performance evaluations of scientific managers.	
	Suitable candidates for scientific management positions.	
3.6 Have competitive scientific and engineering staff salaries.		King
	Salary comparison to data available from ACS, AIP and/or AAES.	
3.7 Have a succession plan for key scientific and engineering personnel.		Jenks
	Plan developed.	

Objectives	Metrics	Responsible Person
3.8 Recruit and hire a diverse, excellent workforce. Increase ethnic diversity of the workforce by 25%, the percentage of women in the scientific and engineering workforce to 25% and the percentage of women in the overall workforce to 40%.		Muncrief
	3 year running average percentage of minority employees.	
	3 year running average percentage of female scientists and engineers, and scientific administrators.	
	Percentage of female employees.	
3.9 Hire three world-class established researchers in areas discussed in Goal 1.		King
	Number of senior researchers hired.	
3.10 Encourage career development.		Jenks
	Career development program(s) designed and implemented.	
	Employee satisfaction with career development opportunities.	

Goal 4: Foster an environment that is conducive to creative and collaborative research.

Objectives	Metrics	Responsible Person
4.1 Encourage new and challenging research.		Chief Research Officer
	Funding level for research outside of existing areas.	
4.2 Hire more-senior, highly collaborative researchers.		King
	Number of papers with external collaborations engaged in by new researchers in comparison to previous, recent hires.	
4.3 Encourage new collaborations between researchers and research areas (both internally and externally). Increase to 70% papers involving collaborations.		Chief Research Officer
	Percentage of publications with collaborators outside of current FWP structure.	
4.4 Develop opportunities for more collaborations with other National Laboratories. Increase percentage of papers published in collaboration with other National Laboratories to 30%.		Chief Research Officer
	Percentage of papers with other DOE National Labs as collaborators.	
	Number and quality of contacts with other Labs.	
4.5 Create industry research alliances around the Lab's core areas of expertise with the goal of accelerating the commercialization of research within these core areas. (related to objective 2.6)		Covey
	Number of work-for-other agreements and memoranda of understanding.	

Objectives	Metrics	Responsible Person
4.6 Enable employees to grow in areas outside of their current expertise.		Chief Research Officer
	Employee satisfaction with growth opportunities.	
	Employee skills inventory.	
4.7 Increase funding from non-BES sources.		Chief Research Officer
	Non-BES funding level.	
4.8 Create a long term, formal mentoring program open to all associated faculty and staff with a participation level of 20%.		Muncrief
	Mentoring program developed for faculty and staff.	
	Employee satisfaction with mentoring program.	
	Participation level.	
4.9 Stimulate new research ideas.		Chief Research Officer
	Number of proposals submitted.	
4.10 Overcome 5% limit of allowable royalty income.		King
	Money remains at the Ames Laboratory.	
4.11 Encourage informal research discussions.		Harmon
	Survey of researchers.	

Goal 5: Conduct research in a safe and secure manner to protect our employees and our environment.

Objectives	Metrics	Responsible Person
5.1 Continue to improve upon our best in class safety culture.		Wessels
	DOE ES&H report card.	
5.2 Improve efficiency and effectiveness of safety and security policies and training.		Wessels
	Employee survey about efficiency of safety and security policies.	
	Number of DOE reportable incidents.	
5.3 Continue to reduce cybersecurity incidents.		Den Adel
	Reportable cyber incidents per unit time per networked system.	
5.4 Become a leader in innovative approaches to cyber security.		Harmon
	Number of presentations at DOE cyber conferences.	
	Number of collaborative cyber projects with ISU, other National Laboratories, and other research institutions.	
	Operational cyber research funding secured.	
	Number of invited talks.	

Appendix A: Committee Members

Cynthia J. Jenks, Chair

Iver Anderson
Andreja Bakac
David Baldwin
Rana Biswas
Mark Bryden
Paul Canfield
Mark Gordon
Alex King
Matt Kramer
Victor Lin
Tom Lograsso
Surya Mallapragada
Diane Muncrief
Ruslan Prozorov
Marek Pruski
Jörg Schmalian
Mary Jo Schmerr
Emily Smith
Chris Strasburg
Ersan Ustundag
David Vaknin
Hans van Leeuwen
Olga Zabotina