EIS

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Sent: Tuesday, June 07, 2005 6:45 PM
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Subject: Bioscience Key Facilities Document Revisions

Attachments: Bioscience_Key_Facilities.doc

Bioscience_Key_Facilities.doc ...

Kirk, attached is the Bioscience Key Facility NEPA Determination Updates. I received this on Friday, June 3, but somehow overlooked it until today. You will notice that this is revisions to the capability table from the 1999 SWEIS NEPA Determination Document for HRL.

thanks, JI
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Bioscience Capabilities

Bio-Materials & Chemistry aimed primarily at determining formation-structure-function relations in biological and biologically relevant materials at macroscopic, microscopic, and molecular scales, with the goal of using this knowledge to create new biologically inspired materials with novel functionalities for a variety of applications, including novel sensor technologies. Synthesis and characterization of biological and biologically relevant materials at scales from the molecular to macroscopic are an integral part of this capability. Characterization tools include spectroscopy with laser sources, microcroscopy, spectral imaging, electrochemistry, mass spectrometry and nuclear magnetic resonance spectroscopy. Stable isotopes (nonradioactive) are also utilized to enable many of these characterization measurements.

Cell Biology focuses on understanding stress responses at the molecular level, in whole cells, and in multi-cellular and cell-environment systems. Historically, cellular response to ionizing radiation has been the primary focus. New focus areas include host-pathogen interactions, the human health effects of exposure to beryllium, and understanding the regulation of plant growth for applications in carbon management and energy. Capabilities include culture and biochemical analysis of a variety of cell types including non-pathogenic environmental microbes, infectious microbes under controlled conditions, plant and mammalian cells.

Computational Biology includes the collection, organization and management of biological data and the development of computational tools to analyze, interpret, and model biological information. We also partner with computational scientists to develop computationally based biological theory and to analyze and model simple and complex biological systems.

Environmental Microbiology focuses on gaining a better understanding of microbial systems and their environment. This capability underpins the Division's ability to achieve our goals in biothreat reduction and is key to our work related to climate change, bioremediation, bio-energy, and environmental monitoring. Capability includes the collection of environmental samples containing microbes; biochemical and genetic analysis of their distribution and functions in ecological systems; and growth and analysis of environmental isolates.

Genomic & Proteomic Science emphasizes the development and implementation of high-throughput (HTP) tools and technologies for understanding biology at the systems level. We perform production sequencing, finishing, clone selection, quality assurance, and bioinformatics, and we develop HTP technologies for high-affinity, high-specificity ligand generation, expression arrays, and proteomics. We also lead an international structural genomics consortium; our technical role is developing methods for HTP protein production and automated structure solution. With focuses on pathogen and environmental microbial sequencing and comparative genomics and on affinity tag production for detection and sensing applications, this capability is central to our biothreat reduction work. Production DNA sequencing, finishing, clone selection, quality

assurance, and bioinformatics. Development of HTP technologies for high-affinity, high-specificity ligand generation, expression arrays, proteomics. Development of methods for HTP protein production and automated structure solution

Measurement Science & Diagnostics encompasses a broad set of technologies: spectroscopy for understanding molecular dynamics and structure and for biomedical applications; imaging microscopy for exploring molecular events using ultrafast time resolution measurements, at times as short as 10-13 sec; and flow-based analyses using flow cytometry methods for measuring everything from single molecules to multicellular spheroids, spanning a size range from 10 Angstroms to 100 microns. A developing area is mass spectrometry for proteomics and structural biology. These technologies provide the platforms and data that can lead to new strategies for detection and sensing technologies. Capabilities include a variety of spectroscopies (UV-vis, IR, Raman, nuclear magnetic resonance) for analysis of biomolecules and biomolecular complexes; flow cytometry-based analysis of materials spanning the range from single molecules, to intact chromosomes, to single cells to multicellular spheroids; and mass spectrometry for proteomics, metabolomics and structural biology.

Molecular Synthesis includes synthesis, materials preparation, and spectroscopic characterization of a variety of compounds. Current work is focused on creating new molecules using natural and enriched stable isotopes for biomolecular structure analysis, for observation of specific chemical groups, and for use as standards in the detection of chemical agents and biological toxins. Additional work in this area includes linking antibodies to biomimetic surfaces; creating chemical and biological microsensors for detection and sensing; developing polymers to protect soldiersí eyes from laser light; and using stable isotopes to demonstrate the feasibility of quantum information processing.

Structural Biology focuses on the determination and analysis of three-dimensional structures and dynamics of macromolecules and the complexes that they form. Experimental techniques include x-ray scattering and neutron diffraction, nuclear magnetic resonance (NMR), and time-resolved vibrational spectroscopies. We serve the national structural biology community by providing state-of-the-art neutron protein crystallography capabilities as part of the Lujan Neutron Scattering Center.

Biothreat Reduction / Bioforensics collection of forensic and molecular biological capabilities used analyze samples for biodefense and national security purposes. Analyses include BSL-2 select agent work AFLP, DNA sequencing, MLVA, SNP and other molecular approaches to identify pathogen strain signatures. This capability also includes ability to undertake classified laboratory and information processing and analysis projects. Note: many of these projects as well as other bioscience work is subject to proper approval by internal and external bodies as appropriate, for example the LANL Institutional Biosafety Committee.