**Bidders Tour Script**
(Welcome, glad you are hear, appreciate your interest, look forward to the exciting times ahead etc.) This part is on your own no script.

**Introduction**

As stated in the Draft RFP "DOE's vision is for the INL to enhance the Nation's security by becoming the preeminent nuclear research, development, and demonstration laboratory within ten years. The INL will also establish itself as a center for national security technology development and demonstration. This requires that the INL be a multi-program National Laboratory with world-class nuclear capabilities…"

What I will be covering this morning deals with a part of the nuclear research, development, and demonstration laboratory that is a portion of INL vision. You will be visiting the Advanced Test Reactor (ATR) and the ANL West facilities tomorrow. These facilities are also a major component in the INL nuclear mission. I will be briefly describing the major research and development nuclear programs and the capabilities at the INEEL, as they exist today. This will be a high level overview that touches on the major programs at the INEEL, and it is not intended to provide a lot of detail. This overview should give you a general feel for the work and the capabilities and the information on which to base further, specific questions. If you do have questions, please submit them through the appropriate channels as described in the RFP. I am not allowed to answer any questions today.

**Generation IV Nuclear Energy Systems Initiative**

Formed by the United States and nine other countries, the Generation IV International Forum (the GIF) was designed to advance nuclear energy as a way to meet future energy needs. The GIF developed eight goals for Generation IV reactor systems in sustainability, economics, safety and reliability, and proliferation resistance and physical protection.

After reviewing more than one hundred proposed reactor designs, the GIF selected six systems for further development:

- Very High Temperature Reactor (VHTR)
- Super Critical Water Reactor (SCWR)
- Gas Fast Reactor (GFR)
- Lead Fast Reactor (LFR)
- Sodium Fast Reactor (SFR)
- Molten Salt Reactor (MSR

The INEEL has lead responsibility to develop three reactor systems – VHTR/ Next Generation Nuclear Plant (NGNP), SCWR, and GFR. Lead responsibilities include addressing technical issues, serving on committees to develop R&D plans, and analyzing and advancing the progress of the systems each year.

The U.S. VHTR is being developed under the NGNP Program. The current work being conducted by the NGNP Program at the INEEL includes developing the NGNP System Design and Evaluation Methods research and development plan, develop the NGNP point design, and NGNP materials research. The program is also responsible for overseeing the Independent Technical Review (ITR) requested by DOE-HQ. This review will identify superior technology alternatives for meeting the functional requirements of the NGNP. Three concepts are under review – a helium cooled prismatic reactor, a helium cooled pebble bed reactor, and a molten salt cooled prismatic reactor. The ITR will address technology uncertainties for each concept in terms of performance benefits and programmatic risks.

At the INEEL, SCWR work involves overseeing contracts related to developing a RELAP startup loop model, improved models for stability and thermal-hydraulic analyses, materials research, and water chemistry control.

For the GFR, the INEEL is overseeing the development of requirements for system design, performance, and safety analysis models, GFR materials requirements; GFR fuel requirements; and contracts for materials research.

The INEEL provides the Generation IV Initiative with System Analysis functions. These include providing recommendations to focus program development direction, which involves ensuring the program is going in the right direction, and integrating system analysis for Generation IV and AFCI. This involves comparing the two program directions and making accommodations in both to ensure they converge on the proper target or objective in a complementary way.

The INEEL also provides the Generation IV Initiative with Technical Integration support. This includes coordinating technical program direction, developing and maintaining external communication products, coordinating and facilitating meetings, publishing monthly and quarterly reports, and project control. Technical Integration includes GIF support by organizing GIF Policy Group meetings, organizing GIF Expert Group meetings, and providing web-based services for working groups as requested by NE-20 Generation IV Program Director.

Capabilities at the INEEL related to Generation IV include expertise in fuels, materials research, reactor operations, computer modeling (both analysis and model development), probabilistic risk analysis, and NRC licensing.

## Advanced Fuel Cycle Initiative

The mission of the Advanced Fuel Cycle Initiative (AFCI) is to develop advanced fuel cycle technologies, which include spent fuel treatment, advanced fuels, and transmutation technologies, for application to current operating commercial reactors and next-generation reactors and to inform a recommendation by the Secretary of Energy in the 2007-2010 timeframe on the need for a second geologic repository. Current legislation requires the Secretary to make a recommendation on the need for a second repository after January 1, 2007, but before January 1, 2010.

The AFCI program will develop technologies to address intermediate and long-term issues associated with spent nuclear fuel. The intermediate-term issues are the reduction of the volume and heat generation (short-term) of material requiring geologic disposal. The program will develop proliferation-resistant processes and fuels for application to current light water reactor systems and advanced gas-cooled reactor systems to enable the energy value of these materials to be recovered, while destroying significant quantities of plutonium. This work provides the opportunity to optimize use of the Nation's first repository and reduce the technical need for an additional repository.

The long-term issue to be addressed by the AFCI program is the development of fuel cycle technologies to destroy minor actinides, greatly reducing the long-term radiotoxicity and heat load of high-level waste sent to a geologic repository. This will be accomplished through the development of Generation IV fast reactor fuel cycle technologies and possibly accelerator-driven systems (ADS). Implementation of these technologies in conjunction with those being developed for application to thermal reactor systems will significantly delay or eliminate the need for an additional repository. Working closely in an integrated manner with the Department's Generation IV Nuclear Energy Systems Initiative, the AFCI program will develop advanced, proliferation-resistant fuels and fuel cycle technologies needed for the next-generation reactor systems.

The AFCI program is comprised of five main research elements: Separations Technology Development; Advanced Fuels Development; Transmutation Engineering; Systems Analysis, and Transmutation Education. The INEEL has capabilities in three areas and is currently involved in research in Separations Technologies, Advanced Fuels Development, and Systems Analysis.

**Advanced Gas Reactor Fuel Development and Qualification Program (AGRF)**

The AGRF is a part of the AFCI. Its goals are:

- Support near-term deployment of an Advanced Gas Reactor for energy production in the United States by reducing market entry risks associated with fuel production and qualification
- Provide a BASELINE fuel performance and qualification data set to support the NRC licensing and operation of the VHTR
- TARGET: Demonstrate fuel performance for a peak fuel centerline temperature of 1250 C, with a VHTR helium outlet temperature of 1000 C

At the INEEL, AGRF work includes co-managing the program with Oak Ridge National Laboratory, managing the BWXT subcontract to produce fuel kernels for program use, developing the design for an irradiation test train, fuel performance modeling, and fission product transport and source term work. Funding for this work is provided through the AFCI and Generation IV Nuclear Energy Systems Initiative.

**Nuclear Hydrogen Initiative**

The goal of the Nuclear Hydrogen Initiative is to demonstrate the viability of nuclear energy to produce an emission-free, economic alternative to fossil fuels. Nuclear energy systems have a unique ability to produce the high temperatures required for several hydrogen production methods without releasing greenhouse gasses to the atmosphere. This hydrogen can then be used in a fuel cell vehicle with zero or near-zero emissions. This would make great progress toward national emissions reduction, as well as national energy security.

Nuclear energy has the potential to remove the remaining barrier for hydrogen technologies to obtain net-zero emissions. According to a study conducted by the DOE Office of Energy Efficiency and Renewable Energy, hydrogen fueled vehicles are anticipated to penetrate 6% of the light duty automobile market by 2025. If this hydrogen were produced from nuclear energy, it would avoid the more than 30 million metric tons of carbon dioxide that would be released from the current fossil-fuel-based hydrogen production method.

For this reason, Nuclear Hydrogen Initiative research and development is an integral part of Federal policy to expand the use of nuclear power and to develop clean fuel technologies for transportation applications. Legislation or regulation alone is impractical as a means of mandating or achieving the development of nuclear hydrogen systems that provide an economic, large-scale, emission-free method of hydrogen production.

Current tasks at the INEEL include research on High Temperature Electrolysis and an infrastructure study in cooperation with ANL to identify the requirements for pilot and engineering scale demonstrations. The Nuclear Hydrogen Initiative ultimately has only one long-term performance goal—to demonstrate commercial-scale hydrogen production using nuclear energy by 2017.

**Fusion Safety Program**

The Fusion Safety Program (FSP) is sponsored by the Office of Fusion Energy Science whose mission is to advance plasma science, fusion science, and fusion technology in order to establish the base needed for an economically and environmentally attractive fusion energy source.

In 1979, the INEEL was designated as Lead Lab for Fusion Safety to support safety engineering in fusion development. The mission of the Fusion Safety Program is to characterize and assess the safety and environmental issues associated with magnetic and inertial fusion and to assist the fusion community in improving the safety and environmental attributes of their designs. The FSP capabilities include regulatory support, risk assessment, safety code development and application, activation production mobilization and transport, chemical reactivity of fusion materials, safety of fusion liquids, tritium behavior in fusion materials, and Tokamak dust characterization.

Research tasks are directed at understanding 1) the behavior of the largest sources of radioactive and hazardous materials in a deuterium-tritium machine, 2) how energy sources in a fusion facility can mobilize radioactive and hazardous materials, and 3) safety and environmental issues associated with emerging fusion design concepts. Research collaborations have been established with Sandia National Laboratories, Los Alamos National Laboratory, Oak Ridge National Laboratory, University of Wisconsin, and the Massachusetts Institute of Technology.

In April 2000, the Office of Fusion Energy Science chose INEEL for their new Safety and Tritium Applied Research (STAR) Facility. STAR is located at the Test Reactor Area. In 2001, STAR was declared a National User Facility so that it may be used by non-DOE programs to perform work on a full cost recovery basis with terms and conditions established by the Work-for-Others Program. It is a multi-purpose research and development laboratory serving the needs of the fusion community for bench-scale and engineering-scale experiments in the area of fusion energy reactors. Typical experiments in the STAR facility include the use of tritium and other hazardous materials like fluoride salts, beryllium metal, and beryllium compounds. The Tritium Plasma Experiment was relocated from Los Alamos National Lab to STAR and investigates how tritium from the plasma interacts with the plasma facing materials. Another project at STAR is a collaborative effort with Japanese scientists that studies the tritium behavior and safety and corrosion issues for molten salts.

STAR is classified as a Radiological Facility with a tritium inventory limit of 16,000 Curies. This capability has applications to a wide range of projects including cleanup technologies, molten salt research and tritium out-gassing measurements. In addition, the ability to handle tritium and other radionuclides makes STAR an excellent choice for performing other experiments. Tritium and molten-salt research activities, research collaboration with other national laboratories, advanced fission-reactor development, and gas-analysis capabilities for characterizing irradiated materials can also be supported by the STAR Facility.

Current research by the Fusion Safety Program includes the evaluation of the consequences of steam reactivity with plasma facing materials during a loss of coolant accident. The Steam-Reactivity Measurements System (SRMS) is used to study material properties for this accident scenario. In particular, the SRMS measures hydrogen generation and tritium mobilization rates of irradiated specimens that are heated and exposed to steam.

Recently it was announced that the US would again participate in the International Thermonuclear Experimental Reactor. The Office of Fusion Energy Sciences is soliciting proposals from the national labs seeking a lead US institution to manage the US contributions to the ITER program. The US ITER Project Office will assume a broad leadership role in the integration of ITER related activities throughout the US fusion program and internationally. The general functions of the ITER Project Office during the construction phase of ITER, anticipated to begin in FY-06, are to provide central project management of the US contributions, procure all hardware contributions, arrange for US personnel to work abroad at the ITER site or in Field Teams, provide the principal US interface with the ITER Organization on ITER construction matters and preparations for ITER operation, and integrate ITER activities throughout the US fusion program and contribute to that integration internationally. The INEEL will be submitting a proposal in response to the request from the Office of Fusion Energy Sciences.

### Work for the Nuclear Regulatory Commission

The INEEL provides support to the NRC through the Work-for-Others Program. Work done for the NRC includes data and data base management, Probabilistic Risk Assessment (PRA) work, risk work, security plan review, and Human Reliability Analysis (HRA).