LLNL History and Current Activities

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September 23, 2006

The Dublin Soroptimist
Dublin, CA, United States
September 26, 2006 through September 26, 2006
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Presented to: The Dublin Soroptimist
September 26, 2006

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This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.
Agenda

- Brief overview of Lawrence Livermore National Laboratory
- Current activities at the NTS
  - NIF
  - Other LLNL activities (brief)
A “new ideas” Laboratory

- Lawrence Livermore National Laboratory (LLNL) is one of two nuclear weapons laboratories in the United States.
- While built on the foundation of weapons research, research in other areas is also conducted.
Team Science in the National Interest

LLNL prides itself in putting together multi-disciplinary teams to solve complex technical problems.
Pushing the Frontiers of Nuclear Weapon Design

- LLNL’s entrance into nuclear testing was a “fizzle”
- Pushing the frontier of science has risk
- Perseverance led to LLNL’s future contributions to smaller warheads and the possibility of the Polaris submarine program
Project Nobska – “We at Livermore can deliver it in 5 years and it will yield 1 megaton.” Edward Teller
First Underground Nuclear Test

1957
Since 1958, many scientists have contributed their expertise to the negotiations of nuclear arms reduction and nuclear test ban treaties.
Understanding the Effects of Radiation

Research into the biological consequences of fallout radiation (begun in 1954) led to the creation of biomedical and environmental research programs at LLNL.
Assessing the Weapons Capabilities of Others

- Since the early days of Livermore, intelligence agencies have sought LLNL expertise to analyze atmospheric nuclear tests conducted by the USSR.
- Nonproliferation, Arms Control, and International Security Directorate works today to respond to WMD proliferation and terrorism.
Industrial-Scale Applications for Lasers

New tools for today’s energy problems
As a national laboratory, LLNL is involved in high-risk, high-value science requiring diverse technical teamwork.
Swords to Plowshares with DYNA3D

• DYNA3D calculation of the crush-up of the nose cone of the B83 strategic bomb

• DYNA3D spread into industry
  » Current users (over 300) represent a “Who’s Who” list of major US firms
  » Study shows $350M savings annually by US industry
LLNL’s biomedical research program has evolved from early radiation studies to become a major player in the international effort to decode the human genome.
Laboratory physicists found the Iraqi isotope separation technology to be similar to early UC enrichment technologies pioneered at UC Berkeley.

Research effort estimated at $8B.
Advanced Sensors Map the Moon

- Six cameras designed and built at LLNL mapped the entire surface of the Moon at resolutions never before attained.
- State-of-the-art technologies developed at LLNL continue to be leveraged into non-weapons related fields.
Understanding the Details of Nuclear Weapon Performance

- The Stockpile Stewardship Program is used to validate the viability and safety of the nuclear stockpile.

- Much of the activities at the Nevada Test Site support this program.
Defending against Terrorism

- Lawrence Livermore and Los Alamos (LANL) National Laboratories deployed the Biological Aerosol Sentry & Information System (BASIS) for 2002 Winter Olympics
- LLNL is poised to make additional contributions to homeland defense
- The NTS will play an important part
JASPER is an example of an outstanding team

- LLNL has lead role in all aspects: technical direction and management of design, startup, and operation of the facility and program
- Bechtel Nevada (BN) supplies resources for facility maintenance & operation, and diagnostic design & operation
- National Nuclear Security Administration (NNSA) has oversight responsibilities

JASPER team: LLNL, BN, and NNSA engineers, scientists, technicians, and administrators
Big Explosives Experimental Facility (BEEF)

- Up to 70,000 lb of explosive authorized
- 1.2 km buffer zone or larger if required
- High-speed optical photography
- Flash x-ray photography
- Laser Doppler velocimetry