Idaho National Laboratory: Overview & Environmental Regulations



INL is the **Nation's Nuclear Energy Laboratory**, and a center for National and Homeland Security and Energy and Environmental research

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www.inl.gov





The views expressed herein are the personal

views of the authors and not necessarily those

of the Department of Energy, Battelle Energy

Alliance, LLC, or other DOE components.



The Idaho National Laboratory – Evolution





Idaho National Laboratory – The Nation's Leading Nuclear Energy Laboratory

Vision:

INL will change the world's Energy future and secure our critical infrastructure.

Mission:

Discover, demonstrate and secure innovative nuclear energy solutions, other clean energy options and critical infrastructure.

DOE's Idaho Site



We Maintain -

- 890 square miles
- 111 miles of electrical transmission and distribution lines
- 579 buildings
- 177 miles of paved roads
- 14 miles of railroad lines
- 3 reactors
- 2 spent fuel pools
- Mass transit system
- Security
- Museum
- "Landfills"
- 300 metric tons of used fuel
- Educational and research partnerships – CAES

Biomass Feedstock User Facility and DHS-ICS CERT



Idaho Falls

Pocatello

Twin Falls

Couer d'Alene

Our Programs

Idaho National Laboratory

Idaho National Laboratory Research Programs



Research – Development – Demonstration – Deployment

INL and MFC Host the Facilities and Personnel to Investigate all aspects of the Nuclear Fuel Research Cycle



Advanced Test Reactor

Neutron Radiography Reactor



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Materials and Fuels Complex Hot Fuels Examination Facility

Hot Fuel Examination Facility main floor

Curiosity rover currently on Mars uses an INL-built and -tested power source



Biomass Feedstock National User Facility

-The biomass feedstock Process Demonstration Unit (PDU) has an innovative modular and reconfigurable design that helps bioenergy companies find the best way to convert feedstock into fuel.





- The BFNUF Characterization Laboratory analyzes feedstocks and feedstock storage performance to aid customers in the development of a high-quality product.



Wireless Research Center

INL can test 2G and 3G handsets and systems on a real world, full-scale network at international GSM / UMTS frequencies



Collaborative Energy Research



Idaho National Laboratory

University of Idaho

Idaho State

CAES Idaho Falls Facility

- 8 Labs (4 with radiological capabilities)

ISU

CAES

o uw

• 150 research staff

BOISE STATE UNIVERSITY

- **Energy Systems Design and Analyses**
- Nuclear Science and Engineering
- Materials Science and Engineering
- **Environmental and Resource Sustainability**
- **Carbon Engineering**
- **Geological Systems and Applications** Policy

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The CAVE

CAES by the Numbers

In the past 5 years:

\$105.1 M

Research and development funding and equipment acquired

3325

Number of students supported by CAES-related projects

814

Number of publications, presentations, and proceeds CAES researchers produced

Environmental Regulation at the INL



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Biomass Feedstock User Facility and DHS-ICS CERT



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The INL is Located on the Eastern Idaho Snake River Plain

- The Plain is comprised of lava flows (fractured basalt) with soil interbeds
- Climate is high desert.
 - Total precipitation is 9-13 in/yr (23-33 cm/yr) Net evaporation is about 40 in/yr (100 cm/yr)
 - Temps -20 F to +100 F (-30 C to 38 C)
- Dominated by species of sage brush, other brush, grasses.
- Diverse wildlife can be found including raptors, sage grouse, coyotes, deer, elk, pronghorn antelope, moose, cougars, wolves, bears
- Nearly the entire area is underlain by the Eastern Snake River Plain Aquifer
 - Depth to water ranges from 200-600 ft (60-180 m)
 - Localized regions are contaminated with chemicals and/or radionuclides
 - Remediation is under CERCLA

Water Resources

- The INL has an adjudicated federal reserved water right
- The INL is traversed by the Big Lost River
 - The river is nearly always dry due to diversion for irrigation
 The river channel is considered "Water of the US"
 - The Little Lost River enters the site near Test Area North
- Birch Creek has a small presence at the northern site boundary
 - No other sources of surface water



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Many Environmental Regulatory Frameworks Apply at the INL, Including

- Clean Air
- Clean Water
- Waste Water
- Underground Storage Tanks
- **Drinking Water**
- Hazardous and Mixed Waste
- Non-municipal Solid Waste
- Radioactive Waste

- Environmental Remediation
- Cultural Resource Protection

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- Wildlife Protection
- Migratory Birds
- National Environmental Policy Act
- TSCA (PCBs, Asbestos)
- Emergency Planning and Community Right to Know

Air Quality

INL is classified as an Attainment/Unclassifiable area for all air pollutants

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- INL is subject to a Tier 1 Air Permit to Operate but is planning to transition to a Permit with a Facility Emissions Cap due to decreases in emissions (e.g., phase out of boilers and diesel engines)
- An air quality monitoring system is utilized on and off-site
- Site-wide air dispersion model is in place
- DOE is subject to the National Emission Standards for Hazardous Air Pollutants from DOE facilities
- An annual Site Environmental Report addresses potential radiation dose to the public



Meterological Tower System





Clean Water Requirements

- No NPDES permits no discharge to surface water
- Depending on location and nature of activity, Storm Water requirements are followed
- Sanitary wastewater and industrial wastewater is managed in lined evaporation ponds or infiltration ponds
 - Plans for sewage systems and lined evaporation ponds reviewed/approved
 - An unlined infiltration pond requires state permit for wastewater reuse





INL Has Identified the Storm Water Corridor



Safe Drinking Water Act

- Public drinking water systems (nontransient/noncommunity) at site facilities
- **Drinking water is taken from groundwater wells**
 - Treatment/purification is generally not required for drinking water after initial system sterilization

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- Drinking water systems are isolated from Firewater, Reactor water systems, and rad-contaminated areas by standard cross-connection prevention methods
- Shallow injection wells (french drains)

Hazardous and Mixed Waste

- INL is a generator of hazardous and mixed waste.
- INL operates several treatment and storage facilities. No disposal of hazardous waste on site.

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- INL has one HWMA Permit comprised of several volumes
- INL also under a Site Treatment Plan/Consent Order which tracks progress on treating mixed waste in compliance with Land Disposal Restrictions
- Universal waste (e.g. batteries, light bulbs)
- 'Legacy waste' also tracked for disposition under Site Treatment Plan and 1995 Idaho Settlement Agreement

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Industrial and Municipal Waste Is Disposed At The INL

- INL operates an on-site non-municipal solid waste landfill
 - This landfill does not accept radioactive waste
- INL CERCLA Disposal Facility accepts waste generated from cleanup activities – soil, debris, contaminated materials from decommissioning facilities
- Programs are in place for waste segregation at each facility for recycling
 - Paper, plastic, metal, batteries, etc



The INL Is A Superfund Site

- Clean up is conducted under a Federal Facility Agreement/Consent order between DOE, EPA and the State of Idaho
- Most waste sites have been remediated
- Some waste sites are under long term control
- Over a large area of the site there is potential unexploded ordnance from historic INL use as a gunnery range
- INL has a process for identifying, characterizing and dispositioning newly discovered areas of contamination



The INL Cultural Heritage

- Archeologists estimate this area has been inhabited by humans for nearly 13,000 yrs through several changes in local climate
- The INL is a rich source of fossils and human artifacts
 - The most recent human artifacts include a dump site used by people living on what would become the INL during the 1930s-1940s

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- Old stage-coach roads and stops still exist
- The Central Facilities Area (CFA) was a community for Navy personnel and families during WWII
- Any INL construction site is surveyed for cultural artifacts prior to construction
- Agreement in Principle with Shoshone-Bannock Tribes addresses tribal consultation and access to site



The INL Is a National Environmental Research Park

- Northern part of the INL is a Sage Brush Steppe reserve
- Universities and other organizations conduct research on plants and animals.
 - Some projects have been underway for decades
- Much of the INL is a relatively undisturbed environment
- No species that occur on the INL are listed as Endangered or Threatened
- Several Species of Concern or Candidate Species occur at the INL
 - Includes sage grouse and pygmy rabbit
- DOE and US Fish and Wildlife have a Candidate Conservation Agreement on management of sage grouse at the INL

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The National Nuclear Laboratory

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ENVIRONMENT & NATURAL RESOURCES LAW SECTION of IDAHO STATE BAR As of December 31, 2014, 2015 & 8/31/2016

| Year Ended 2014 | Year Ended 2015 | | Actual Aug 2016 | Budget 2016 | Variance Favorable (Unfavorable) |
|-----------------------|-----------------------|--|-----------------------|----------------|--|
| | | INCOME STATEMENT | | | |
| | | REVENUE (NON-CLE) | | | |
| 3,240 | 3,550 | Dues | 3,480 | 3,500 | (20) |
| 0 | 0 | Donations | 0 | 0 | 0 |
| 0 | 0 | Special event revenue | 0 | 0 | 0 |
| 0 | 0 | Other income | 0 | 0 | 0 |
| 3,240 | 3,550 | TOTAL NON-CLE REVENUE | 3,480 | 3,500 | (20) |
| | | EXPENSE (NON-CLE) | | | |
| 1.025 | 1.164 | Administrative fee to ISB | 676 | 1.150 | 474 |
| 16 | 16 | Postage | 9 | 10 | 1 |
| 27 | 12 | Copies | 0 | 10 | 10 |
| 16 | 0 | Supplies | 0 | 5 | 5 |
| 1,576 | 1,896 | Governing Board | 1,009 | 2,000 | 991 |
| 10 | 19 | Bank & credit card fees | 42 | 20 | (22) |
| 250 | 1,000 | Donations | 500 | 1,000 | 500 |
| 0 | 0 | Other | 0 | 0 | 0 |
| 2,920 | 4,106 | TOTAL NON-CLE EXPENSE | 2,236 | 4,195 | 1,959 |
| | | CLE, RECORDED PROGRAMS & PUBLICATIONS: | | | |
| | | Bevenue: | | | |
| 3,299 | 3.213 | CLE registrations | 3.097 | 3.000 | 97 |
| 0 | 0 | Publications | 0 | 0 | 0 |
| 170 | 555 | Recorded programs | 285 | 200 | 85 |
| 422 | 483 | Royalties | 0 | 400 | (400) |
| 3,891 | 4,251 | CLE Revenue | 3,382 | 3,600 | (218) |
| | | Expense [.] | | | |
| 1 488 | 1 254 | CLE seminar expense | 1 129 | 1 150 | 21 |
| 1,100 | 1,342 | CLE administrative fee paid to ISB | 844 | 850 | |
| 225 | 225 | Recorded program expense | 260 | 225 | (35) |
| 2 957 | 2 821 | CLE Expense | 2 233 | 2 225 | (8) |
| | | | | | (0) |
| 935 | 1,430 | NET CLE INCOME (LOSS) | 1,150 | 1,375 | (225) |
| 1,255 | 874 | NET INCOME (LOSS) | 2,394 | 680 | 1,714 |
| | | | | | |

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| Year Ended 2014 | Year Ended 2015 | | Actual Aug 2016 | Budget 2016 | Variance Favorable <u>(Unfavorable)</u> |
|--|-------------------------------------|---|---------------------------------------|----------------|---|
| | | BALANCE SHEET | | | |
| | | ASSETS | | | |
| 4,348 241 166 226 4,982 | 5,106 121 783 215 6,225 | Cash and cash equivalents Accounts receivable Due from (to) other funds Prepaid expenses TOTAL ASSETS | 7,507 0 92 0 7,599 | | |
| | | LIABILITIES AND FUND BALANCE | | | |
| | | LIABILITIES | | | |
| 0 650 | 0 1,020 | Accounts payable Deferred revenue | 0 | | |
| 650 | 1,020 | TOTAL LIABILITIES | 0 | | |
| | | FUND BALANCE | | | |
| 3,077 1,255 | 4,332 874 | Beginning fund balance Current year income (loss) | 5,205 2,394 | | |
| 4,332 | 5,205 | TOTAL FUND BALANCE | 7,599 | | |
| 4,982 | 6,225 | TOTAL LIABILITIES & FUND BALANCE | 7,599_ | | |