

Lessons Learned: A Process For Improving Safety Performance

Presented by
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BNFL Inc.
SELLS FALL CONFERENCE
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Atlanta, Georgia

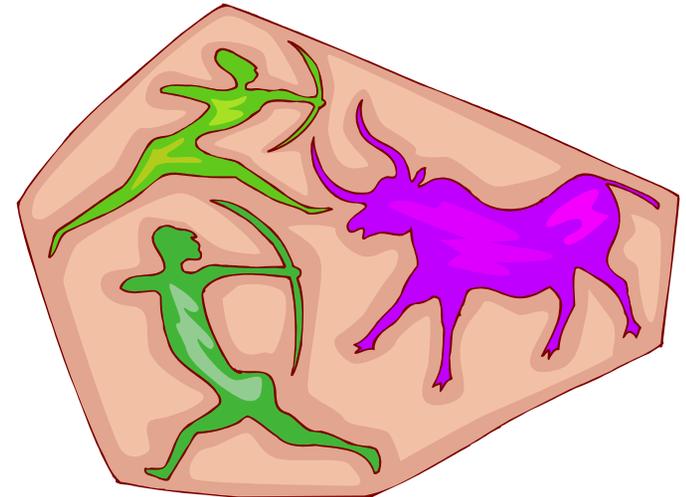
What Will Be Covered

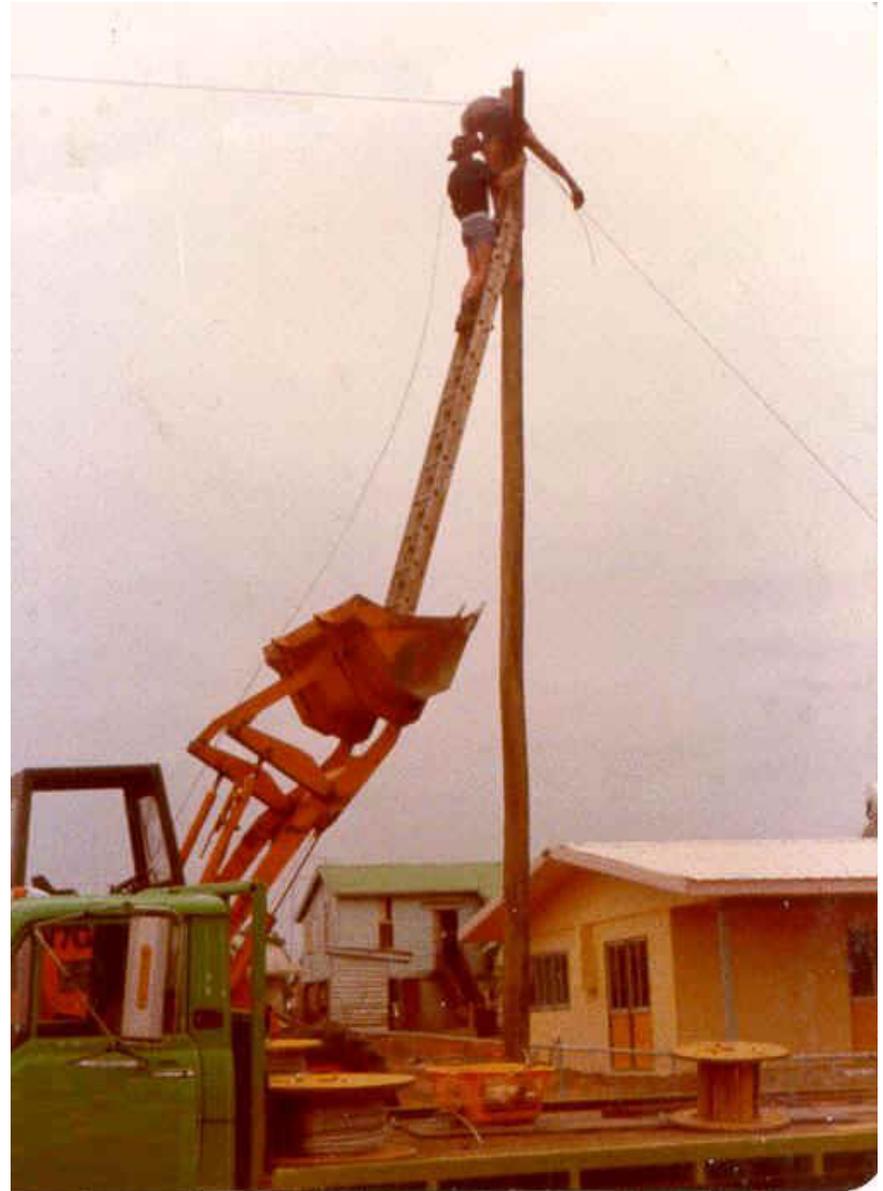
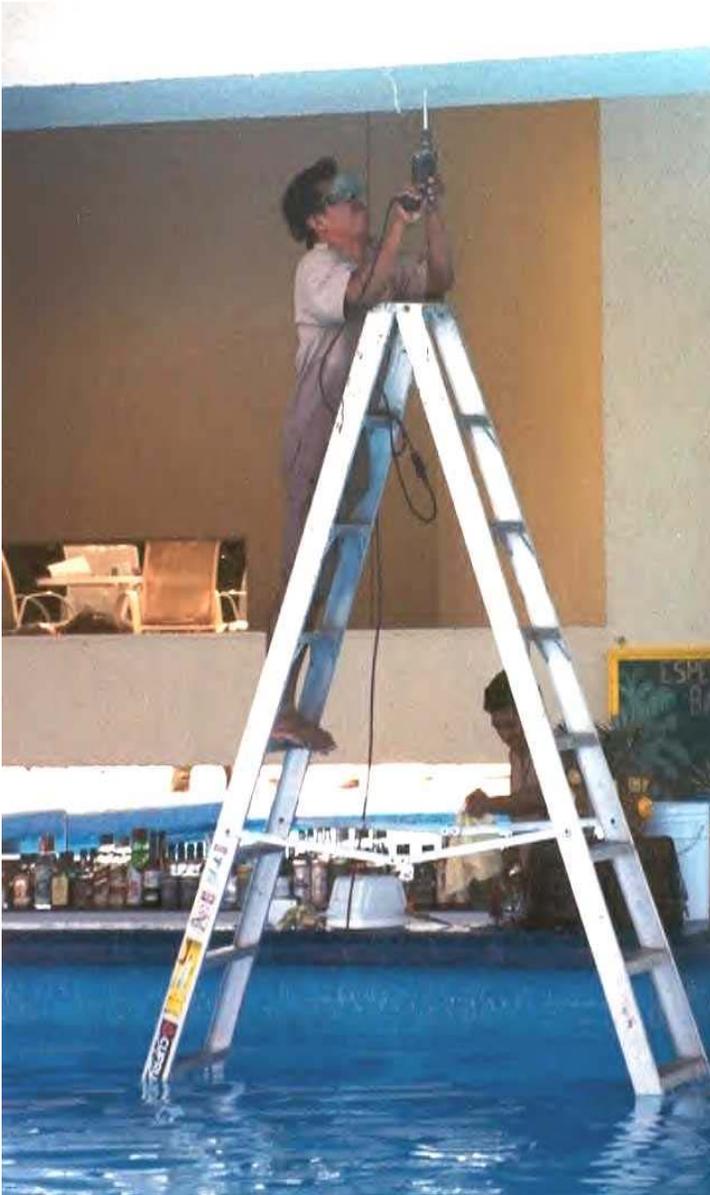
- What is Knowledge Management
- Case Study - BNFL
- Case Study - NASA
- Developing a Safety Focused OEF program
- Milestones to success

References

- **Better Mechanisms Needed for Sharing Lessons Learned**, GAO Report to the Subcommittee on Space and Aeronautics, Committee on Science, House of Representatives, January 2002 – GA-02-195
- **The DOE Corporate Lessons Learned Program**, 1999, DOE-STD-7501-99
- **Columbia Accident Investigation Board Report**, August 2003
- **Culture Shock**, Frank Moring, Jr., Aviation Week and Space Technology, September 1, 2003, pp 22-24.
- **Failure an Option?**, Craig Covault, Aviation Week and Space Technology, September 1, 2003, pp 27-31.
- **Echoes of Challenger**, Craig Covault, Aviation Week and Space Technology, April 28, 2003, pp 29-31.

Early Lessons Learned





Lessons Learned





Lessons Learned

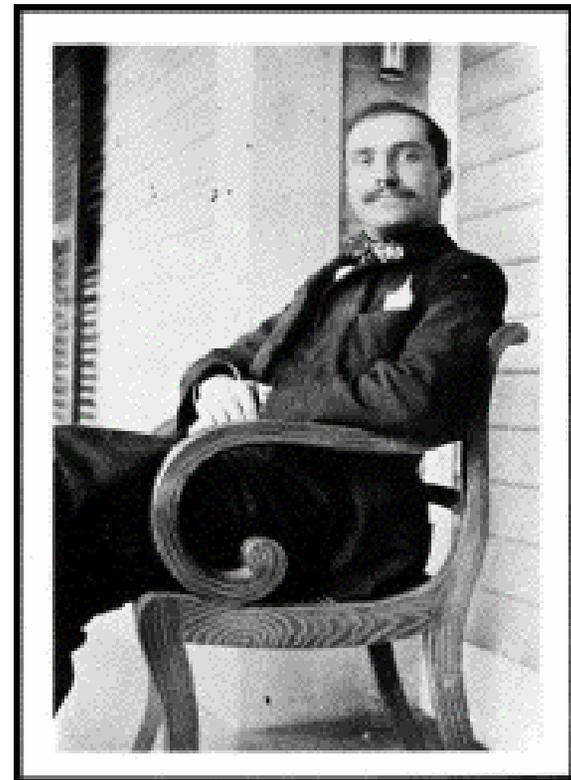


**Knowledge Management, Operational Experience
Feedback, Learning From Experience
or **Lessons Learned****

**Is a principal component of an
organizational culture committed
to continuous improvement.**

“Those who cannot remember the past are condemned to repeat it.” George Santayana (1863 - 1952)

- American philosopher
- Poet
- Novelist
- Literary and cultural critic



BNFL Overview

- A Full-Service Global Nuclear Company with 13% of the world market
- 26,000 People in 15 Countries
- 4 Major Business Lines
 - Fuel & Reactors
 - Power Generation
 - Spent Fuel Management
 - Legacy Clean-up
- Substantial Technology and Experience Base with an Annual R&D Budget \$160M

Britain's nuclear industry

UK nuclear sites



Sellafield

Windscale piles
First major nuclear reactor built in the UK

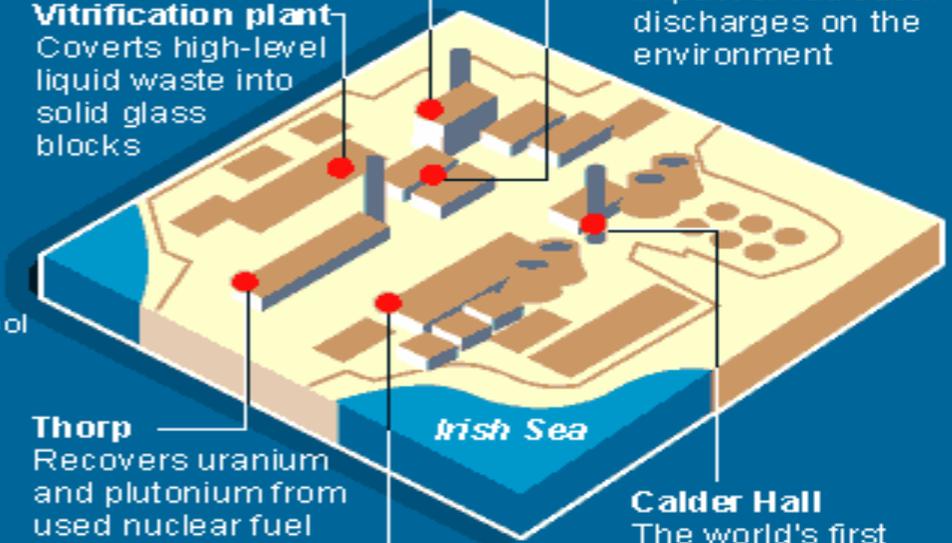
Vitrification plant
Converts high-level liquid waste into solid glass blocks

Low active effluent
Five plants designed to minimise the impact of radioactive discharges on the environment

Thorp
Recovers uranium and plutonium from used nuclear fuel

Fuel handling
Processes used fuel prior to reprocessing in Thorp

Calder Hall
The world's first industrial-scale nuclear power station



Sources: Friends of the Earth, BNFL

Sellafield

5 square miles



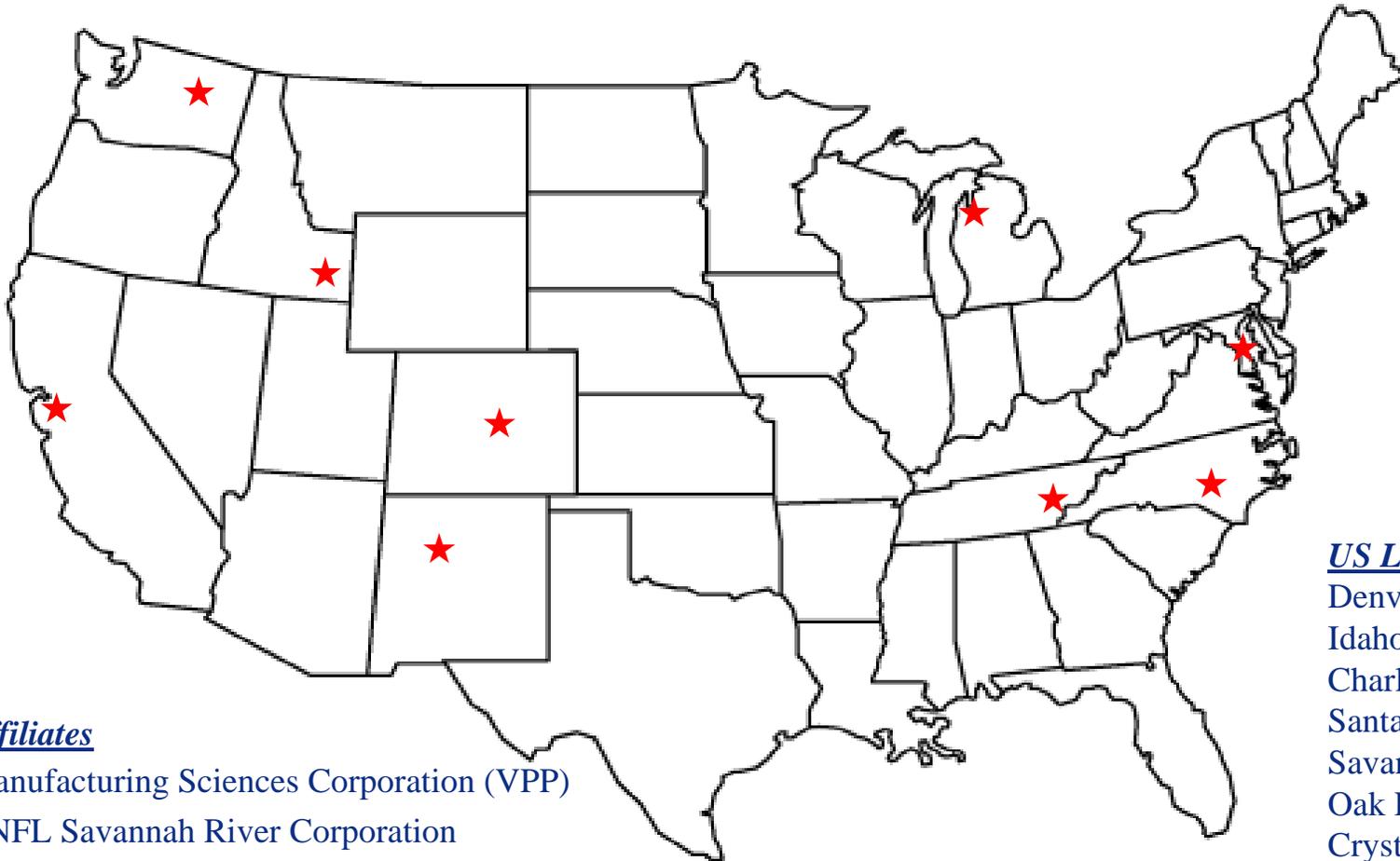




Health & Safety Executive
reducing risks - protecting people

“Lessons to be learned and experience from other UK and non-UK nuclear operations should be considered both during the investigation phase, and periodically to detect any patterns which could help identify causes.”

BNFL Inc. Locations



Affiliates

Manufacturing Sciences Corporation (VPP)

BNFL Savannah River Corporation

BNFL Instruments Division

US Locations

Denver, CO

Idaho Falls, ID

Charlevoix, MI

Santa Fe, NM

Savannah River, SC

Oak Ridge, TN

Crystal City, VA

Richland, WA

Campbell, CA

ETTP 3-Building D&D and Recycle Project



- Up to 4 million pounds per week of material is removed
- 235.5 million cumulative pounds of material have been removed from the project site
- Dismantle 1540 converters, compressors and motors
- Dismantle 463 miles of piping
- Decontaminate 4.9 million square feet of building floor space
- Dispose of 328 million lbs. of total material

ETTP

- Completed over 10,017 waste shipments
- Completed 6,011 critical lifts
- 1,037 critical lifts still remaining
- Surpassed 1,000,000 man-hours without a lost time accident (2nd time in 2 years)
- Removed over 408 miles of piping
- Processed and disposed 1,299 converters



ETTP



INEEL – AMWTP, Idaho Falls, Idaho



- BNFL Inc. financed, owned and operated
- Includes design, construction, operations and decommissioning
- Treat and package 65,000m³ of transuranic and MLW
- Retrieval initiated and two TRUPACs shipped to WIPP.

AMWTP



AMWTP



AMWTP





Big Rock Point, Charlevoix, MI

- Commissioned in 12/1962
- End of service 8/1997
- World's first high power BWR (67mw)
- 5th commercial reactor in U.S.A.

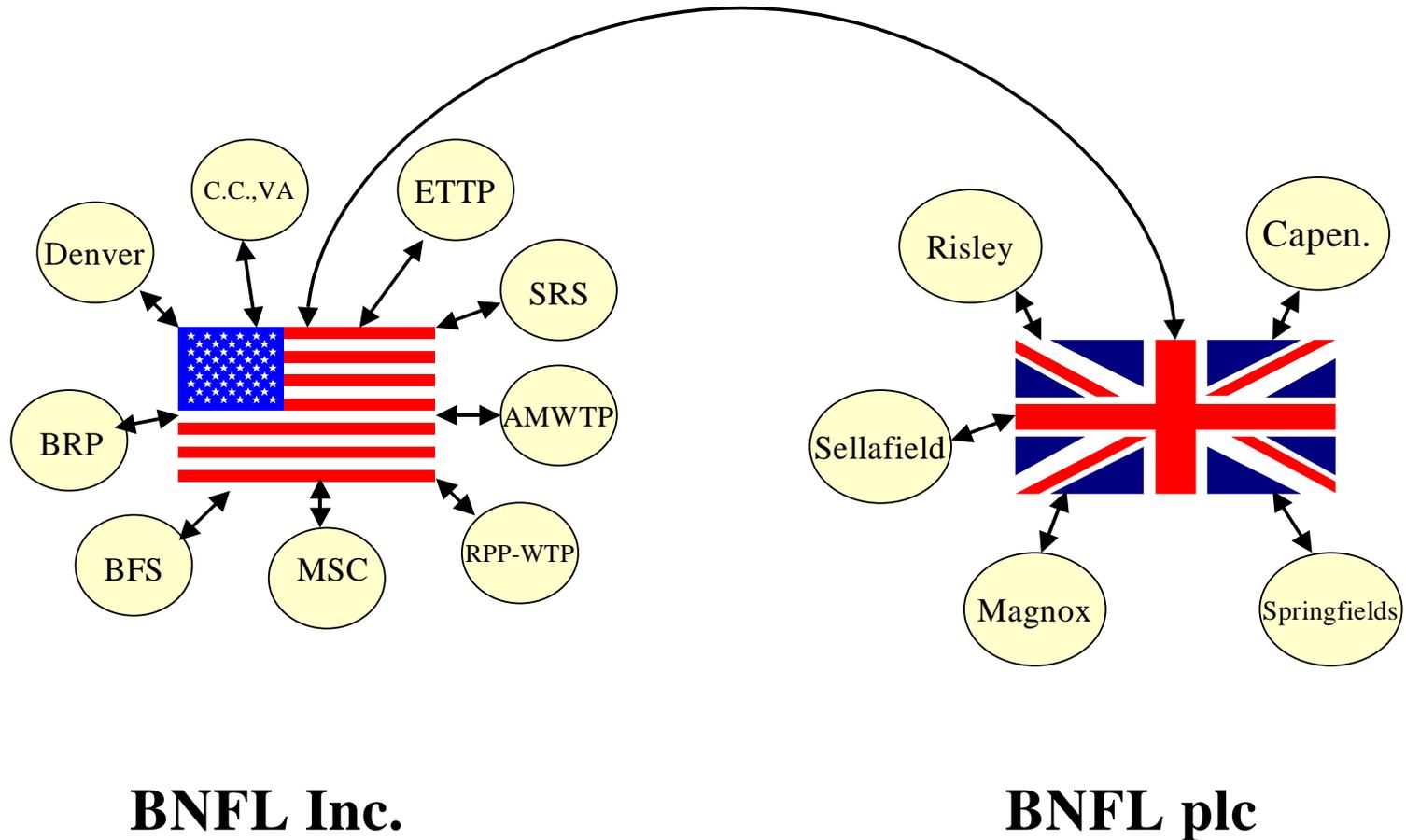
- Reactor vessel 120 tons
- Removed without exceeding dose limits with 5 – 7 rem/hr
- Most unique reactor vessel
- Container designed by BNFL Inc.

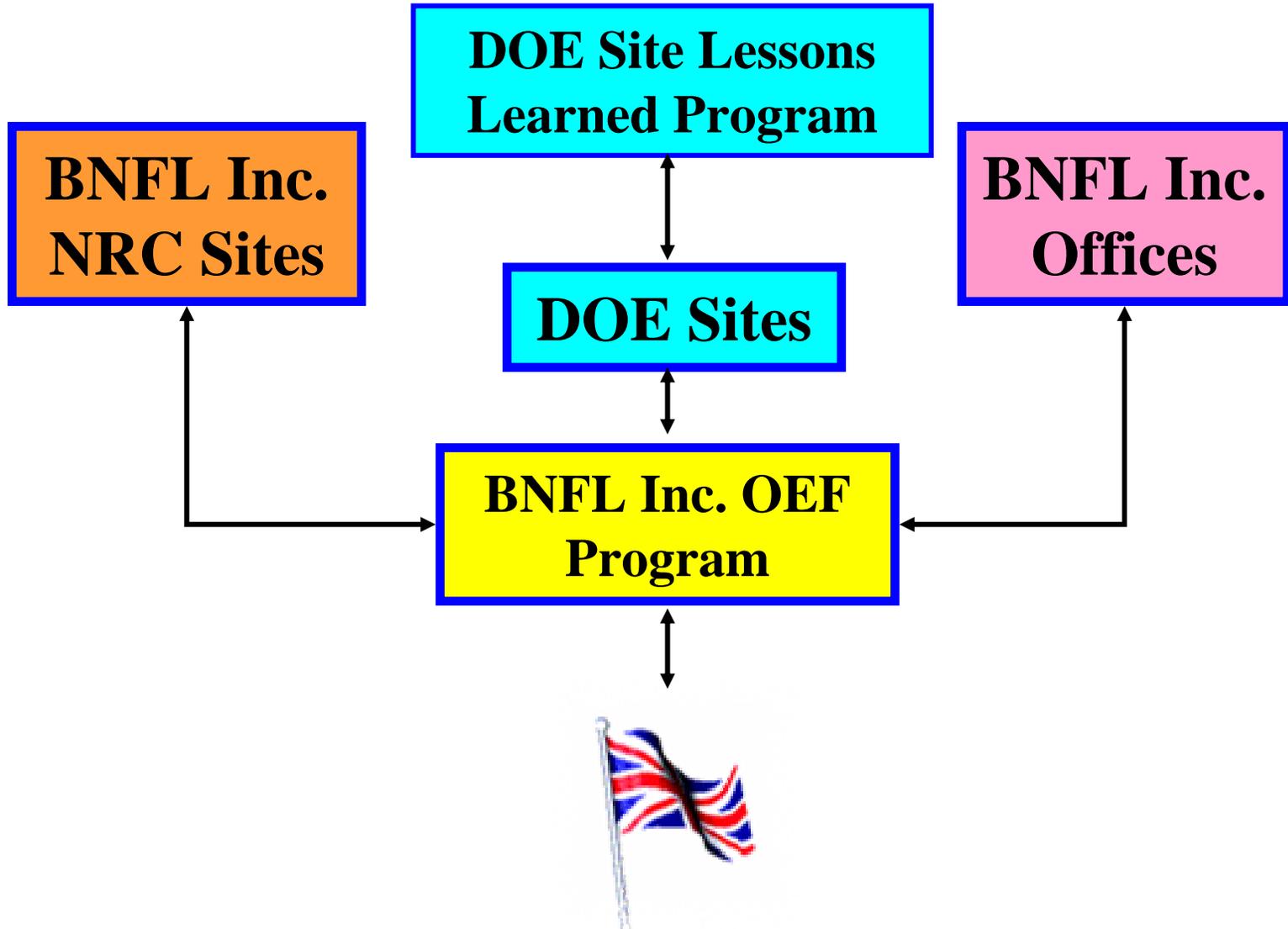


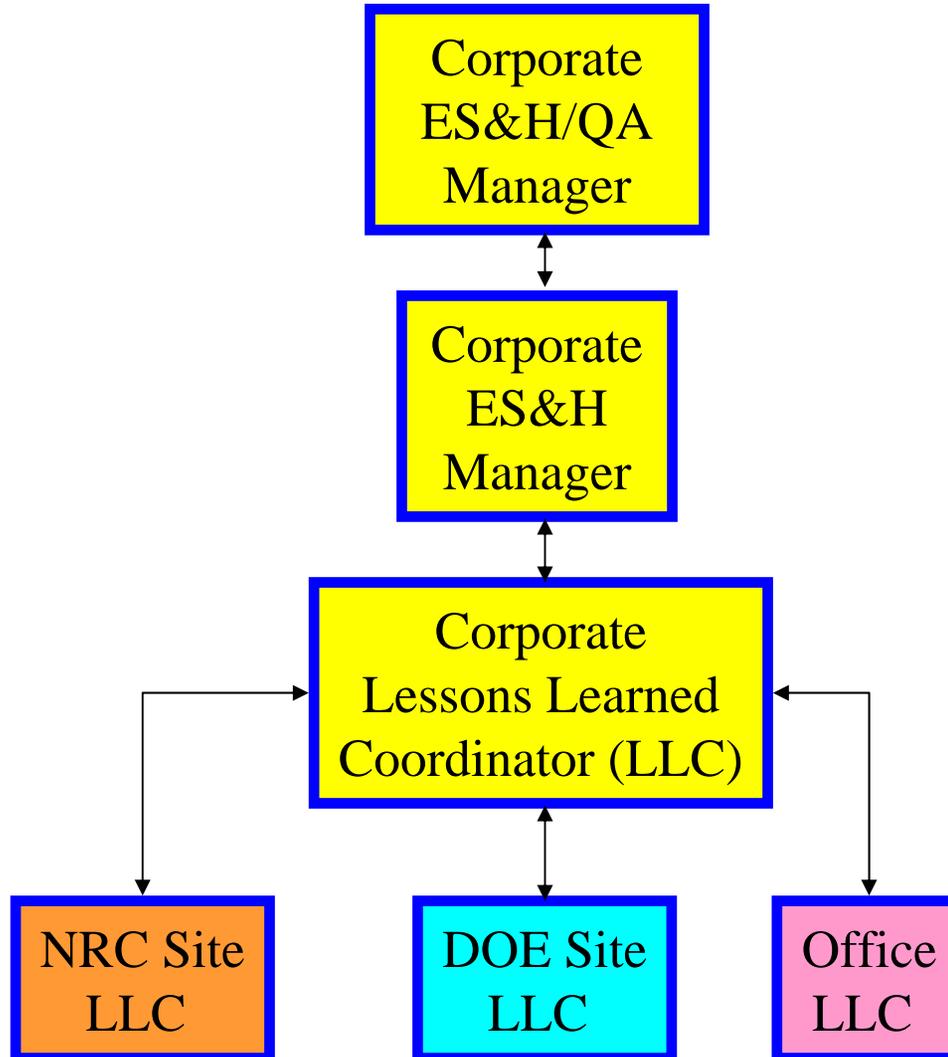
Lessons Learned



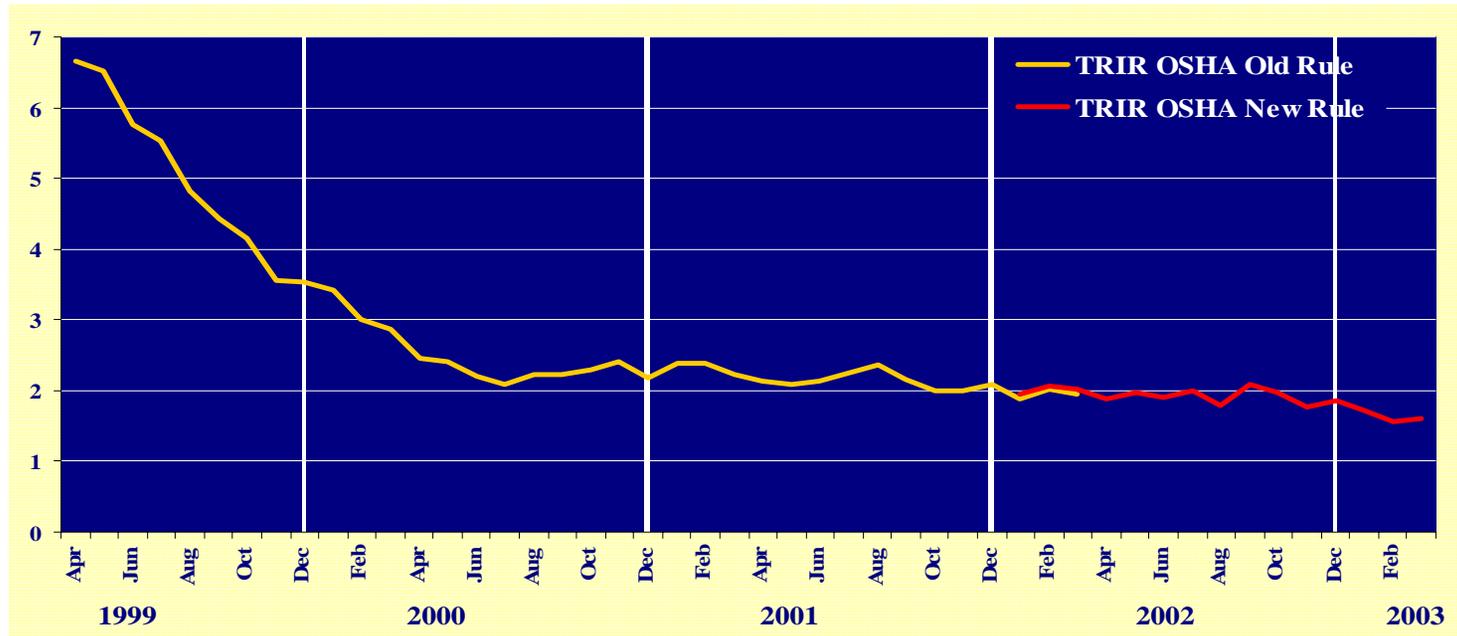
SHARING OF INCIDENT/LESSONS LEARNED INFORMATION



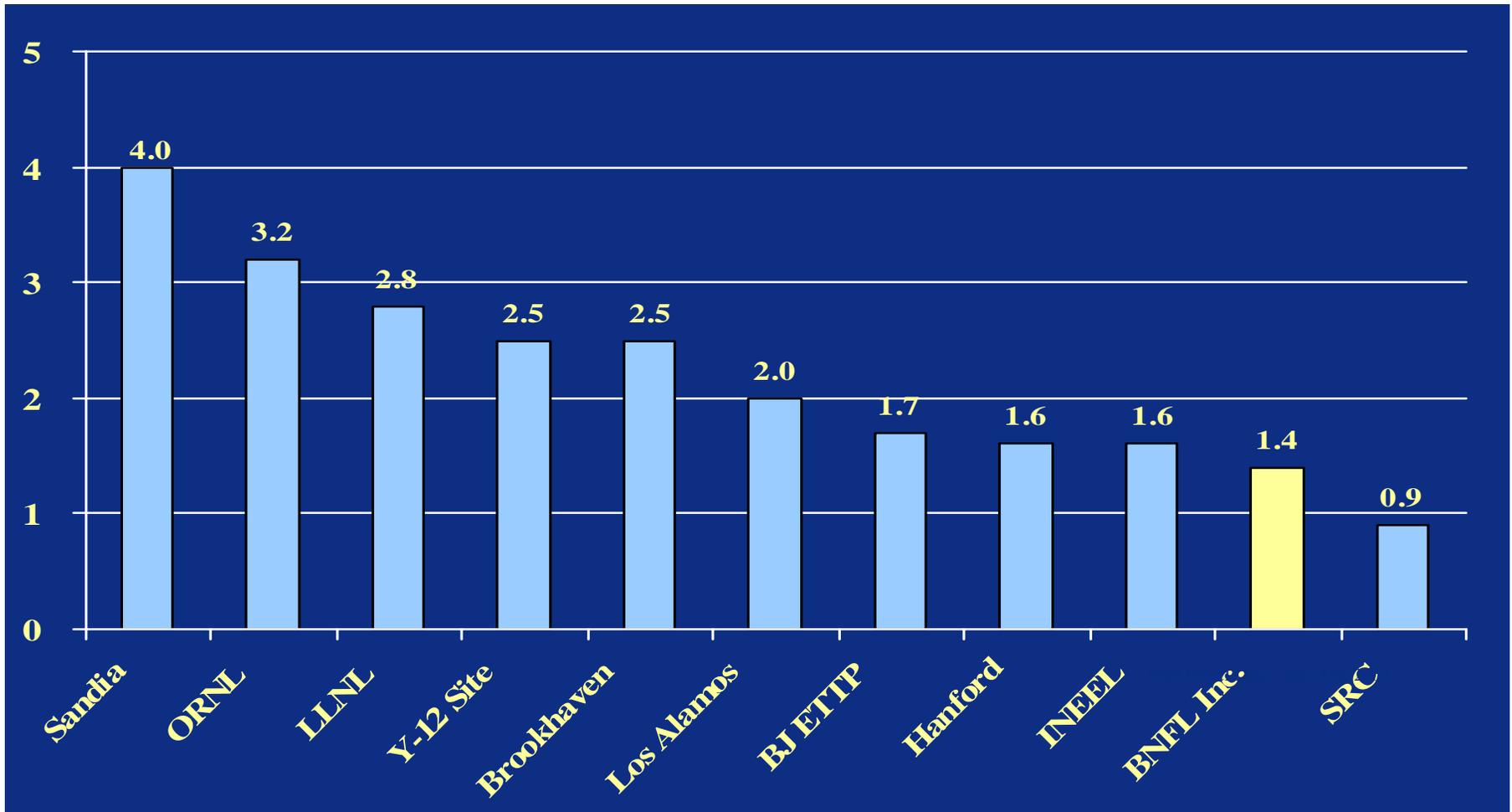




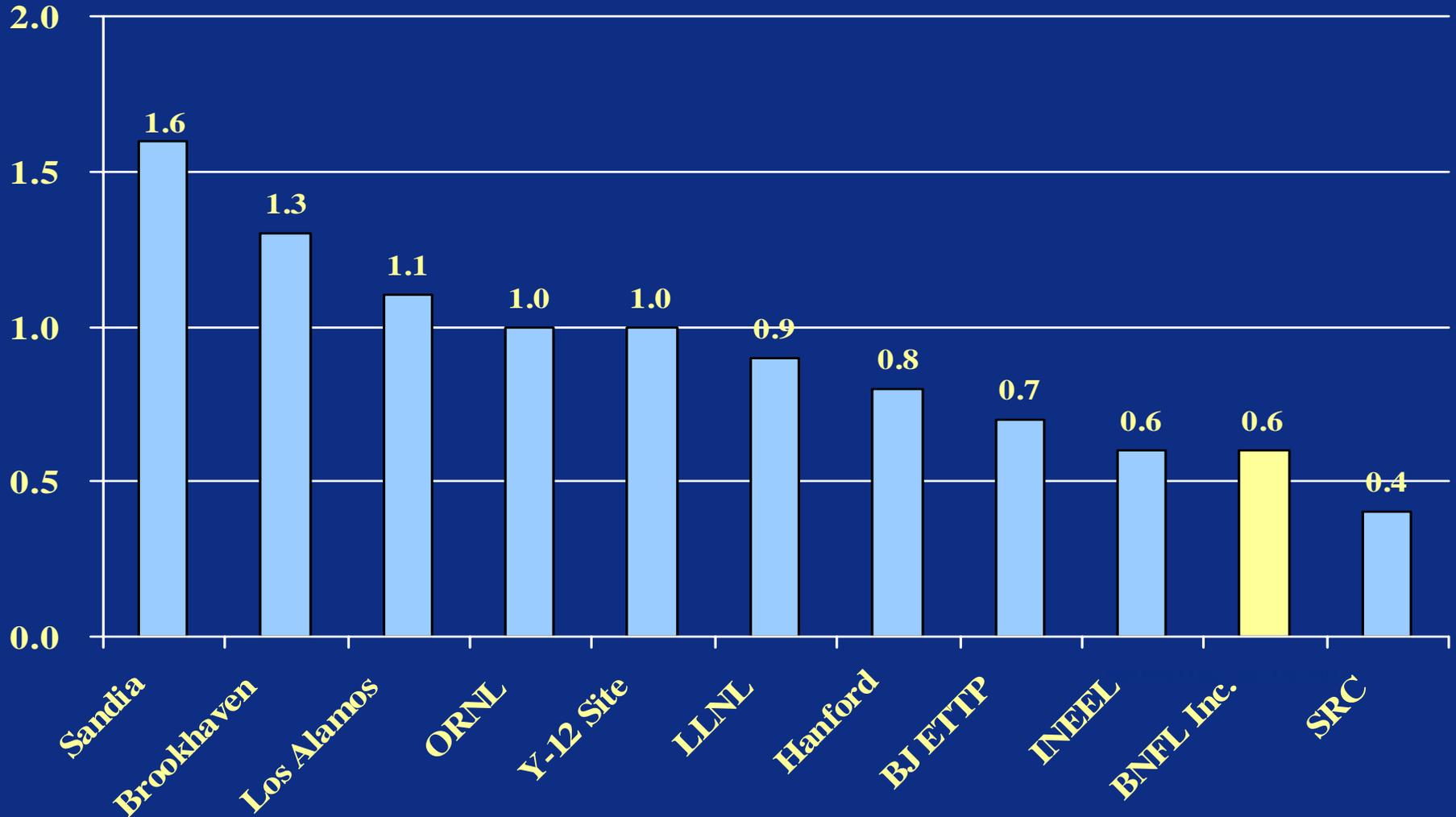
BNFL Inc. TRIR Performance



TRIR As of March 2003 BNFL Inc. Vs M&O/M&I (Employees & Sub-Contractors)



DART As of March 2003 BNFL Inc. Vs M&O/M&I (Employees & Sub-Contractors)



- **Current Lessons Learned Program**
 - **ES&H and QA Focused**
 - **Good mix of internal and external lessons**
 - **High percentage of best practices**
 - **Strong Management support of the program**
- **Program Future**
 - **Expanding to include other disciplines**
 - **Consistent with WANO/INPO guidelines**
 - **World Association of Nuclear Operators**
 - **Institute of Nuclear Power Operations**
 - **Enhanced Database capabilities**
 - **Pushing lessons**
 - **Adding graphics capabilities**

BNFL Inc.

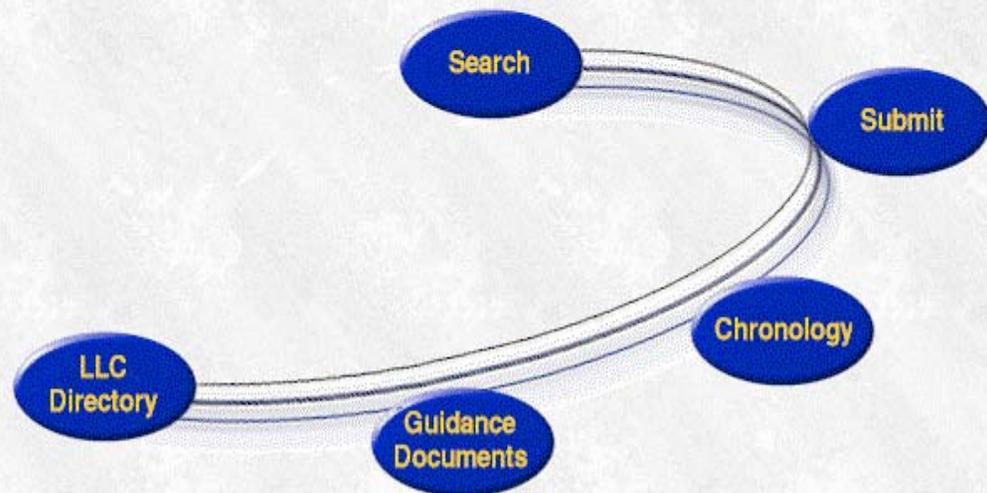
Lessons Learned Website





Lessons Learned Program Database

Welcome to the BNFL Inc. Lessons Learned Program Database (LL Database). The purpose of the Lessons Learned Program, of which the LL Database is a component, is to share and use information to: 1) promote the recurrence of desirable activities, and 2) preclude the recurrence of undesirable activities. The LL Database is designed to facilitate the sharing of information in a consistent manner across BNFL Inc. Finally, the use of lessons learned is a principal component of an organizational culture committed to continuous improvement.



BNFL Inc. 

Lessons Learned Program

Criteria Search Page

<p>BNFL Inc. Functional Categories:</p> <ul style="list-style-type: none"> All Alternate Fuels Authorization Basis Business and Support Services Conduct of Operations - Configuration Management Conduct of Operations - General Conduct of Operations - Lock and Tag Conduct of Operations - Procedure Adherence Conduct of Operations - Procedure Development Conduct of Operations - Work Control 	<p>Priority Descriptor:</p> <ul style="list-style-type: none"> All Blue / Information Green / Good Work Practice Red / Urgent Yellow / Caution
<p>Hazard Categories:</p> <ul style="list-style-type: none"> All Confined Space Electrical / NEC Elevated Work / Falling Objects Environmental Release Ergonomics / Lifting Excavation & Trenching Fire / Smoke / NFPA Firearms & Explosives Lasers 	<p>ISM Core Functions:</p> <ul style="list-style-type: none"> All Analyze Hazards Define Work Develop / Implement Controls
<p>Project/Office/Subsidiary Location:</p> <ul style="list-style-type: none"> All ABB Combustion Engineering Advanced Mixed Waste Treatment Facility Aiken Office Big Rock Point BNFL Fuel Solutions BNFL Savannah River Corp Decommissioning & Decontamination Operations Denver Office East Tennessee Technology Park 	<p>Keyword Search:</p> <input type="text"/> <p>(Searches the Summary, Discussion, Analysis & Keyword Fields)</p> <p>Unique Identifier:</p> <input type="text"/>
	<p>Examples:</p> <p>Entering 2000-DENV-0001 returns one lesson.</p> <p>Entering DENV returns many lessons.</p>
	<p>Date From: Date To:</p> <p>(earliest) (latest)</p> <p>earliest latest</p>

Criteria Search Page

BNFL Inc. Functional Categories:

- Maintenance - Electrical
- Maintenance - Facility
- Maintenance - Heavy Equipment
- Maintenance - HVAC
- Maintenance - Instrumentation and Controls
- Maintenance - Mechanical
- Maintenance - Other
- Maintenance - Power Distribution and Utilities
- Maintenance - Roads and Grounds
- Maintenance - Safety Systems

Hazard Categories:

- All
- Confined Space
- Electrical / NEC
- Elevated Work / Falling Objects
- Environmental Release
- Ergonomics / Lifting
- Excavation & Trenching
- Fire / Smoke / NFPA
- Firearms & Explosives
- Lasers

Project/Office/Subsidiary Location:

- All
- ABB Combustion Engineering
- Advanced Mixed Waste Treatment Facility
- Aiken Office
- Big Rock Point
- BNFL Fuel Solutions
- BNFL Savannah River Corp
- Denver Office
- East Tennessee Technology Park
- Fairfax Office

Priority Descriptor:

- All
- Blue / Information
- Green / Good Work Practice
- Red / Urgent
- Yellow / Caution

ISM Core Functions:

- All
- Analyze Hazards
- Define Work
- Develop / Implement Controls

Keyword Search:

(Searches the Summary, Discussion, Analysis & Keyword Fields)

Unique Identifier:

Examples:

Entering 2000-DENV-0001 returns one lesson.

Entering DENV returns many lessons.

Date From:

(earliest)

Date To:

(latest)



Lessons Learned Program

Identifier: [2003-MSCI-0001](#)

Date: [6/2/2003](#)

Title: Implementation of Engineering and Process Controls Reduces Radiological Exposure

Summary: By evaluating the source of potential radiological exposure to determine if engineering and process changes could occur, does rates can be significantly reduced as required by ALARA (As Low As Reasonably Possible) considerations.

Identifier: [2003-DOPS-0003](#)

Date: [5/14/2003](#)

Title: Failure to Follow Manufacturer's Recommendations Results in Contamination

Summary: Ensure that all manufacturer's recommendations for the setup and operations of their equipment is verified by conducting an engineering evaluation. This evaluation should always be performed to assess associated systems, compatibility, components to be used and conditions and materials that will be encountered.

Identifier: [2003-DOPS-0002](#)

Date: [3/13/2003](#)

Title: Inadequately Marked Conduit Leads to Pressure Line Intrusion

Summary: When air gapping electrical conduit, pneumatic or hydraulic lines, they need to be marked allowing for 360 degree identification to be visible at any angle.

Identifier: [2003-DOPS-0001](#)

Date: [1/31/2003](#)

Title: Safety Equipment May Represent a Safety Concern

Summary: When implementing safety controls assure that they do not introduce an additional potential hazard into the work environment.



BNFL Inc.



Lessons Learned Program

Chronological Search Page

Information is displayed in Descending Chronological Order (i.e. Most Recent First).

All Lessons	<input type="button" value="2003"/>	<input type="button" value="2002"/>	<input type="button" value="2001"/>	<input type="button" value="2000"/>	<input type="button" value="1999"/>	<input type="button" value="1998"/>	<input type="button" value="..."/>
Red/Urgent	<input type="button" value="2003"/>	<input type="button" value="2002"/>	<input type="button" value="2001"/>	<input type="button" value="2000"/>	<input type="button" value="1999"/>	<input type="button" value="1998"/>	<input type="button" value="..."/>
Yellow/Caution	<input type="button" value="2003"/>	<input type="button" value="2002"/>	<input type="button" value="2001"/>	<input type="button" value="2000"/>	<input type="button" value="1999"/>	<input type="button" value="1998"/>	<input type="button" value="..."/>
Blue/Information	<input type="button" value="2003"/>	<input type="button" value="2002"/>	<input type="button" value="2001"/>	<input type="button" value="2000"/>	<input type="button" value="1999"/>	<input type="button" value="1998"/>	<input type="button" value="..."/>
Green/Good Work Practice	<input type="button" value="2003"/>	<input type="button" value="2002"/>	<input type="button" value="2001"/>	<input type="button" value="2000"/>	<input type="button" value="1999"/>	<input type="button" value="1998"/>	<input type="button" value="..."/>

BNFL Inc.



Lessons Learned Program

Authorized User Login

Lessons Learned User Name

Lessons Learned Password

Submit a New Lesson

Edit an Existing Lesson

[Lessons Learned Home](#) | [Corporate ESH/QA Home](#) | [Search](#) | [Chronology](#) |
[LL User Manual](#) | [LLC Directory](#) | [DOE LL Home](#)

BNFL Inc.



Lessons Learned Program

New Lesson Input Form

Posting Date:

25-Sep-00

Title:

Unique Identifier:

Date:

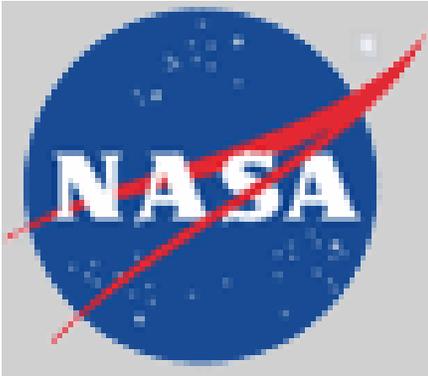
Project/Office/Subsidiary Location:

ABB Combustion Engineering
Advanced Mixed Waste Treatment Facility
Aiken Office
Big Rock Point
BNFL Fuel Solutions

Lesson Learned Statement:

Discussion:

Lessons Learned



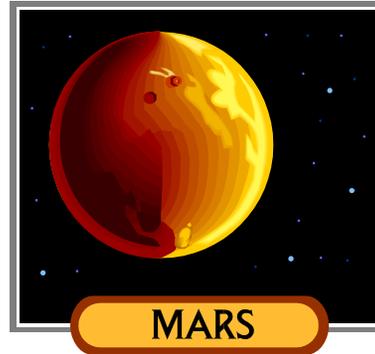
NASA's Definition of Lessons Learned



“Knowledge or understanding gained by experience. The experience may be positive or negative. A lesson must be significant in that it has real or assumed **impact on operations**; **valid** in that it is factually and technically correct; and **applicable** in that it identifies a specific design, process, or decision that reduces or limits the potential for failures and mishaps, or reinforces a positive result.”



Mars Climate Orbiter



Mars Polar Lander

\$142.6M\$ to Develop



\$75M\$ to Develop



Mars Climate Orbiter

- Launched 12/11/98
- Lost 9/23/99
- **Use of English rather than Metric units in navigation software.**



- Launched 1/3/99
- Lost 12/3/99
- **Software allowed early shutdown of descent engines.**

Mars Polar Lander



EVALUATION OF NASA'S LESSONS LEARNED SYSTEM

(GAO Report 1/2002)

Findings

- ✓ Lessons learned system not used due to a lack of awareness about the system.
- ✓ Posted lessons were seen as not being useful.
- ✓ Many managers saw no value to lessons learned.
- ✓ Lessons learned process is seen as time consuming.
- ✓ Reluctance to share negative lessons as it reflects on manager's effectiveness.

EVALUATION OF NASA'S LESSONS (Continued)

Recommendations

- Provide leadership, support and resources to effectively implement lessons learned.
- Articulate the relationship between lessons learned and Knowledge Management.
- Designate a Lessons Learned Manager/Coordinator to lead effort.
- Identify incentives to encourage collection and sharing of lessons.
- Submit lessons learned in a timely manner to lessons learned system.
- Review DOE's and 7 other organizations recognized as having effective lessons learned programs.

Lessons Learned



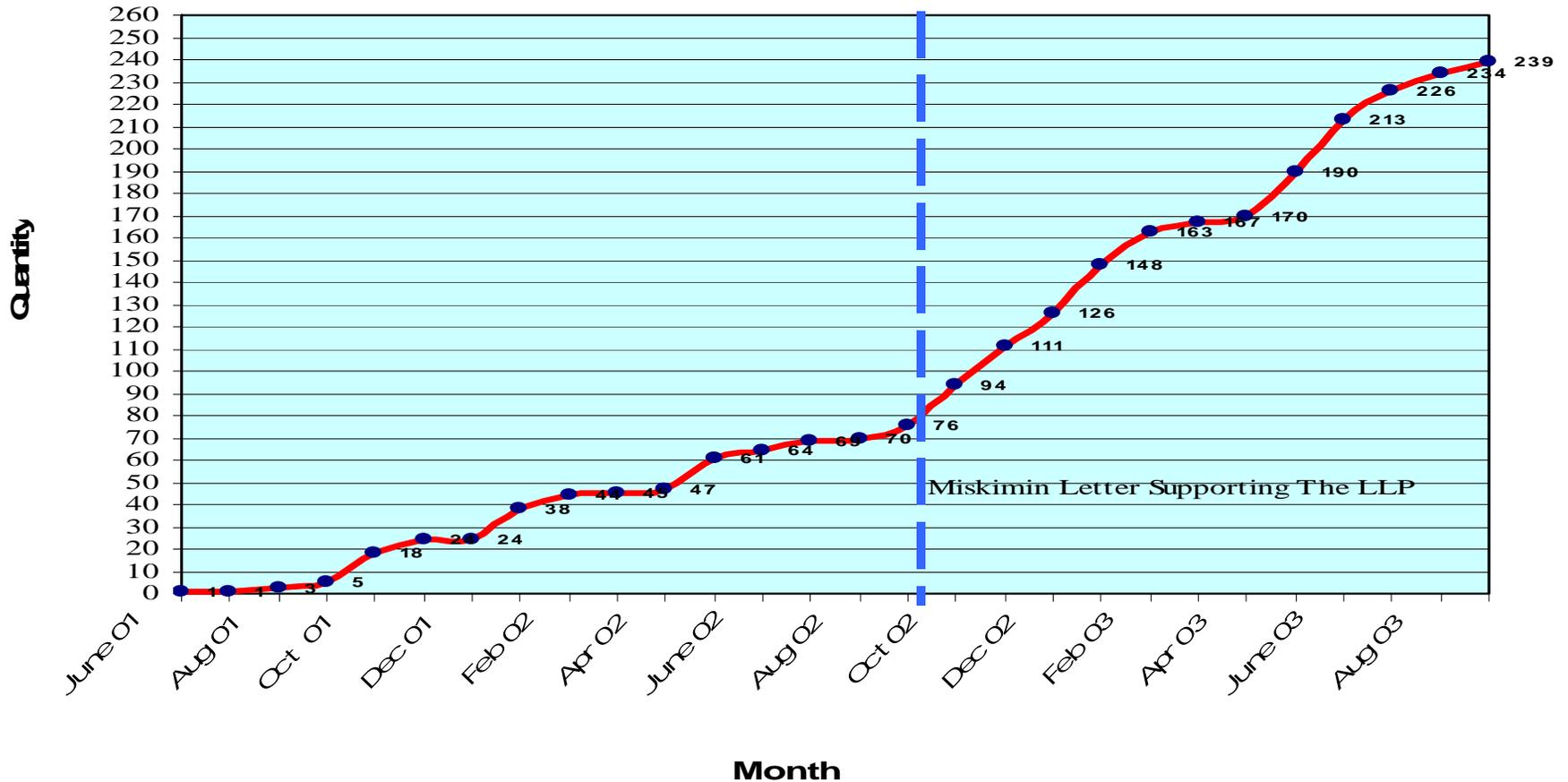
COLUMBIA – 2/1/03

“NASA, as an organization, did not learn from its previous mistakes and did not properly address all the factors that the Challenger presidential commission identified.” Diane Vaughan, Boston College, Advisor to CAIB

Program Performance Metrics

- Lessons generated per year.
- Cumulative posted lessons.
- Number of lessons posted per month.
- Lessons generated per year per site.
- Total lessons generated per site.
- Percent of Lessons Learned Generated By Site.
- Number of posted lessons by Priority Descriptor.
- Percent of total lessons posted by Priority Descriptor.
- Percent of Internally versus Externally generated Lessons.
- IIRs versus Posted Lessons Per Year Per Site.

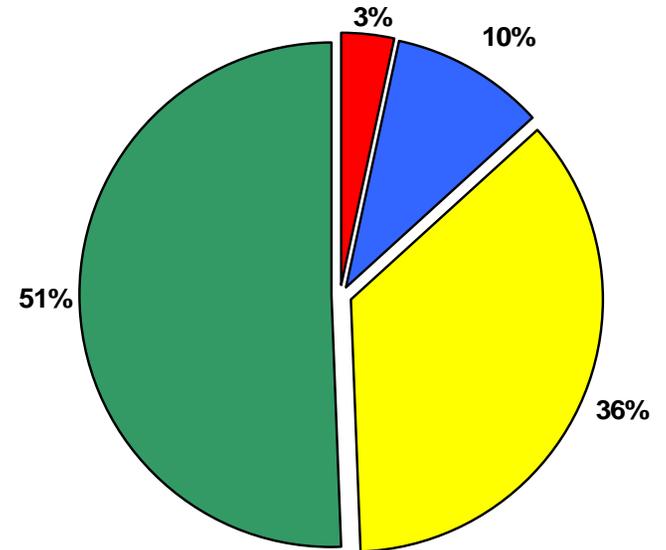
Cumulative Lessons Learned per Month As of 9/5/03



Percent of Lessons Per Priority Descriptor BNFL Inc. 239 Lessons

As of 9/05/03

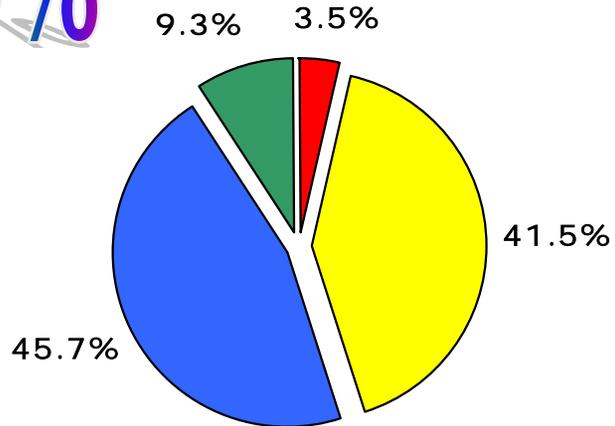
61%



Priority Descriptors For 1347 SELLS Lessons

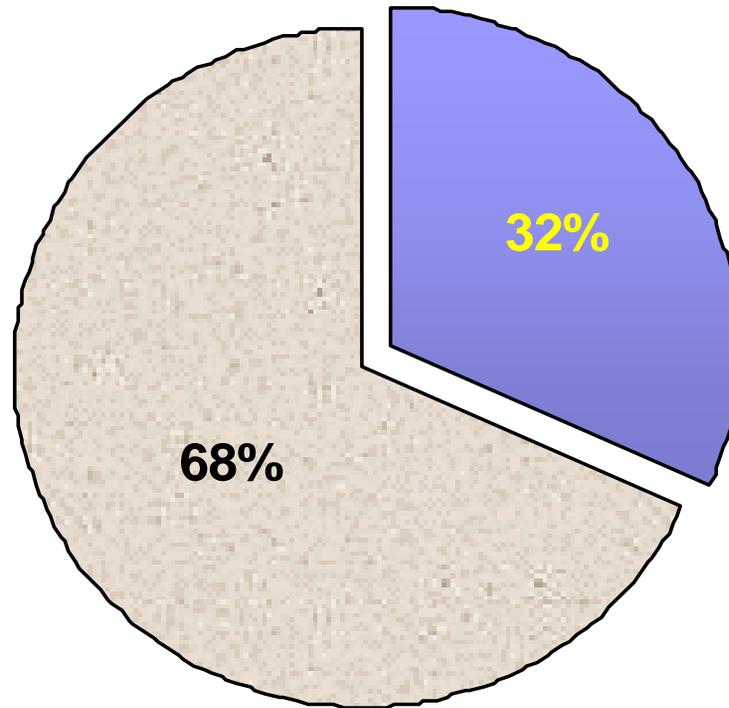
(as of 6/26/03)

55%



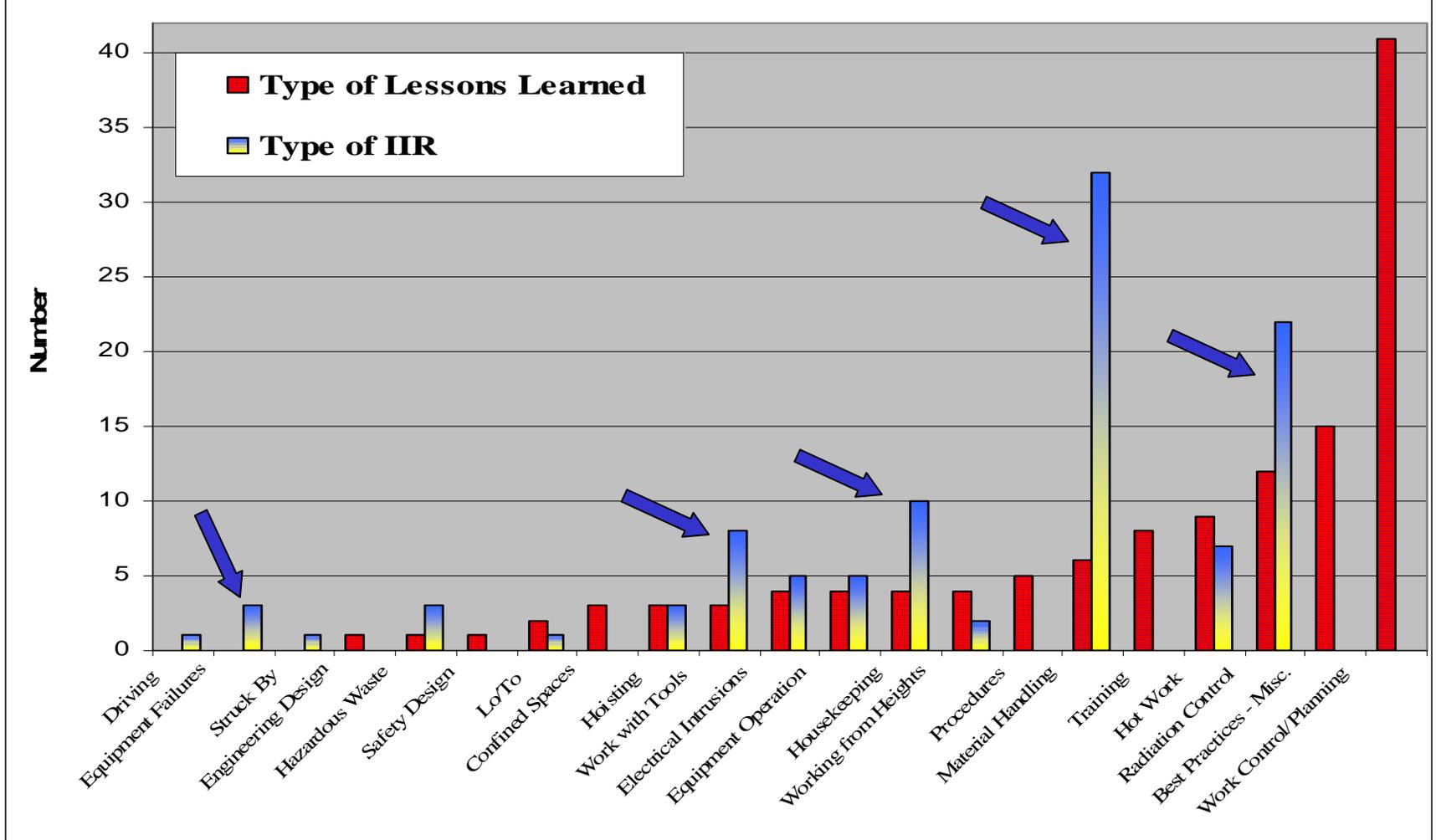
- Urgent
- Caution
- Information
- Best Practices

Internal vs External Generated Lessons Learned



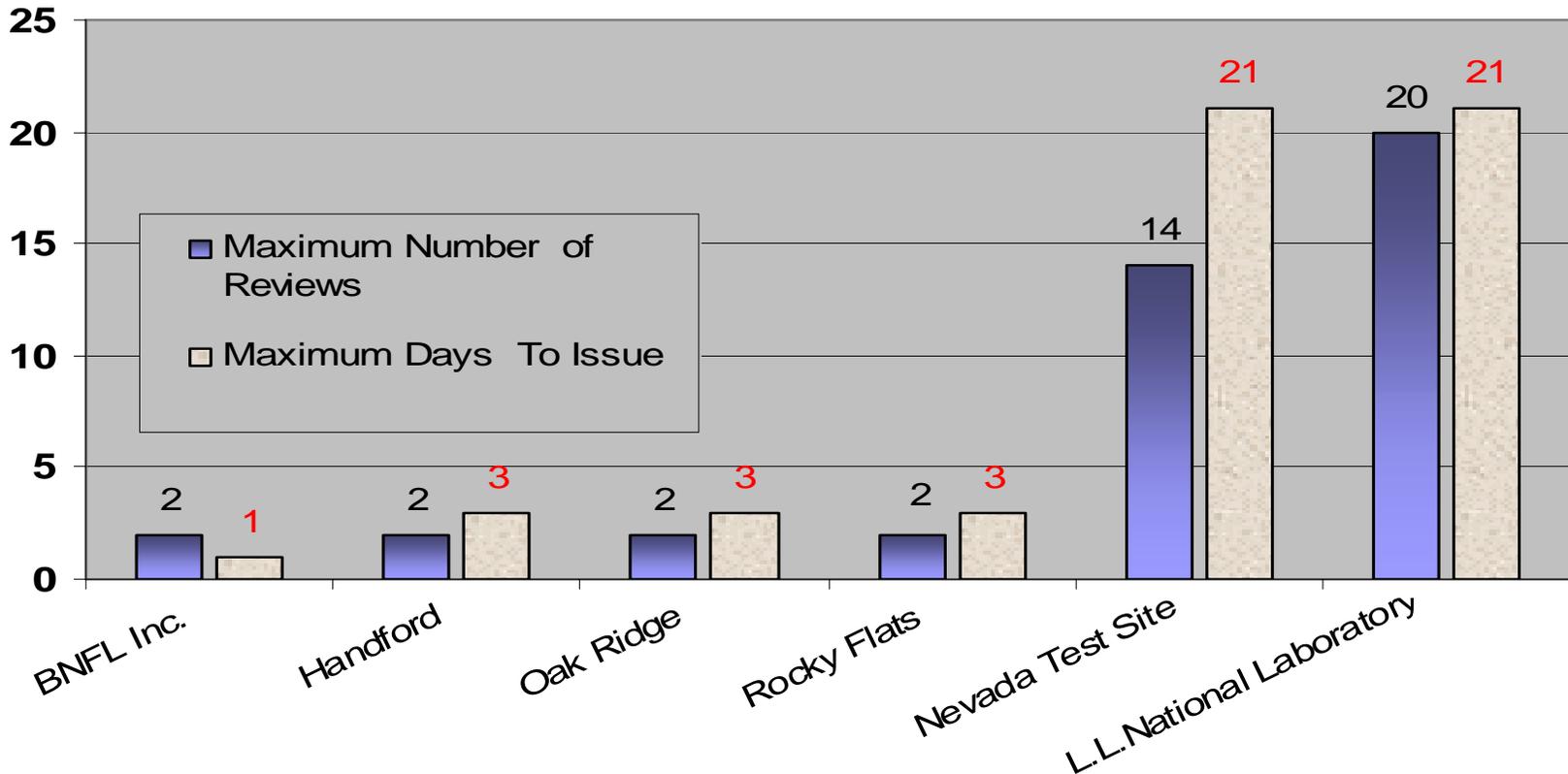
■ External
■ Internal

Number of Lessons and IIRS By Category



Issues Associated with Publishing Lessons Learned

(Data obtained from Fall 2002 SELLS Workshop Discussion.)





Thank



YOU