The exchange of experience from a global fuel cycle operator point of view

Workshop on Fuel Cycle Safety
Wilmington, NC October 2007

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AREVA
Introduction to the AREVA group
An integrated offer serving energy professionals
AREVA across the globe

41 countries
Production & Manufacturing

100 countries
Marketing & Sales

Two-thirds of AREVA’s sales revenue
Are coming from outside France

North & South America

17% of sales
- Nuclear: 67%
- T&D: 33%

12% of employees

Europe & CIS

62% of sales
- Nuclear: 76%
- T&D: 24%

73% of employees

Asia-Pacific

14% of sales
- Nuclear: 47%
- T&D: 53%

11% of employees

Africa & Middle East

7% of sales
- Nuclear: 9%
- T&D: 91%

4% of employees

Two-thirds of AREVA’s sales revenue are coming from outside France.
# Main AREVA Group Nuclear Installations

The main nuclear installations of the AREVA group:

<table>
<thead>
<tr>
<th>Place</th>
<th>Business Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romans, France</td>
<td>Fuel</td>
<td>Fuel Fabrication</td>
</tr>
<tr>
<td>Dessel, Belgium</td>
<td>Fuel</td>
<td>Uranium and MOX Fuel Fabrication</td>
</tr>
<tr>
<td>Lingen, Germany</td>
<td>Fuel</td>
<td>Fuel Fabrication</td>
</tr>
<tr>
<td>Richland, USA</td>
<td>Fuel</td>
<td>Fuel Fabrication</td>
</tr>
<tr>
<td>Lynchburg, USA</td>
<td>Fuel</td>
<td>Fuel Fabrication</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Chemistry</td>
<td>Preparation of uranium hexafluoride $(\text{UF}_6)$</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Chemistry</td>
<td>Conversion of uranyl nitrate into $\text{U}_3\text{O}_8$</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Enrichment</td>
<td>Georges Besse Plant – isotopic separation of uranium by gaseous diffusion</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Enrichment</td>
<td>Dismantling of the former military enrichment plants</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Enrichment</td>
<td>Plant for uranium decontamination and recovery</td>
</tr>
<tr>
<td>Tricastin, France</td>
<td>Chemistry</td>
<td>Conversion of enriched uranium-bearing materials</td>
</tr>
<tr>
<td>Maubeuge, France</td>
<td>Equipments</td>
<td>Maintenance of contaminated equipment</td>
</tr>
<tr>
<td>Cadarache, France</td>
<td>Recycling</td>
<td>MOX Fuel Fabrication (Commercial Production shut down in July 2003)</td>
</tr>
<tr>
<td>La Hague, France</td>
<td>Treatment</td>
<td>Used fuel treatment plant</td>
</tr>
<tr>
<td>Marcoule, France</td>
<td>Recycling</td>
<td>Melox – MOX Fuel Fabrication</td>
</tr>
<tr>
<td>Marcoule</td>
<td>Treatment</td>
<td>Used fuel treatment plant undergoing dismantling</td>
</tr>
<tr>
<td>Veurey, France</td>
<td>Treatment</td>
<td>Experimental facilities and uranium oxide pellet manufacturing facility (currently being Dismantled)</td>
</tr>
</tbody>
</table>

Main AREVA mining activities are located in Canada, Niger & in Kazakhstan
Safety: a commitment
A group united around sustainable development values

- Clearly expressed values (Values Charter) based on the 10 principles of the U.N. Global Compact linked to human rights, labor conditions, environmental protection and anti-corruption efforts

- Implementation through AREVA Way, a continuous improvement process structured around our 10 sustainable development commitments and integrated into the general management system

- AREVA Way is also a way of being and a way of acting, every day:
  - The will to improve, anticipation, responsiveness and openness to dialogue
A sustainable development program structured around 10 major commitments

- **ECONOMIC DEVELOPMENT**
- **CUSTOMER SATISFACTION**
- **FINANCIAL PERFORMANCE**
- **PREVENTION AND CONTROL OF TECHNOLOGICAL RISKS**
  - Ensure and maintain the highest level of safety in all the group’s activities to preserve employee and public health and to protect the environment.
- **COMMITMENT TO EMPLOYEES**
  - Promote our employees’ professional development and provide good working conditions.
- **DIALOGUE AND CONSENSUS BUILDING**
  - Establish relations with our stakeholders built on trust.
In terms of policies and programs:

- **AREVA Charter Values**
- **Sustainable development program**
- **AREVA Occupational Safety Policy**
- **AREVA Nuclear Safety Charter**
Risk management and prevention: a shown priority (2)

Integrated in the management process: First item on each BU budget presentation agenda

<table>
<thead>
<tr>
<th>SAFETY</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents at work with sick leave</td>
<td>actual</td>
<td>actual</td>
<td>actual</td>
<td>actual</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td>5.00</td>
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<tr>
<td>Seriousness</td>
<td></td>
<td></td>
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<td>0.20</td>
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</table>

<table>
<thead>
<tr>
<th>DOSIMETRY</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average exposure rate to ionizing radiation (mSv)</td>
<td>actual</td>
<td>actual</td>
<td>actual</td>
<td>half year.1 half year.2</td>
</tr>
<tr>
<td>Group employees</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Subcontractor employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nº of persons &gt; 14 mSv</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nº of persons &gt; 20 mSv</td>
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<tr>
<td>AREVA Group objectives</td>
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<tr>
<td>AREVA Group Actual</td>
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<tr>
<td>AREVA Group Actual</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2007 fiscal year UPDATE 1</td>
<td>actual</td>
<td>Local objective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>trim.1</td>
<td>trim.2</td>
<td>trim.3</td>
<td>trim.4</td>
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<tr>
<td>AREVA Group objectives</td>
<td></td>
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</tr>
</tbody>
</table>

Local objective 12 rolling months 2007 fiscal year UPDATE 1

Actual

2006

0

0
Corporate Safety, Health and Security missions

- **Lead and Coordinate**
- **Prepare the group policies**
- **Check the implementation of policies**
- **Report**
- **Promote experience feedback and Share good practices**
- **Represent the group and make its realisations known**
Complementary missions

- **Site**
  - Respect the licenses and authorizations

- **Business Units**
  - Take into account safety & security in the strategic, commercial & financial decisions

- **Corporate Department**

  A mission for each level of the organization…

  …complementary assignments
The exchange of experience: A primary mission
A department in charge of General Inspectorate & Nuclear Safety reports to the Executive Board

A double competence under the responsibility of the General Inspector

- 6 Inspectors with previous experience of responsibilities on site
  - Verification independent of the operating organization
  - Can demand the shut down of a facility & report thereon to the Executive Board

- 8 safety specialists, on different fields of expertise:
  - Lead network of the field specialists on site

Complementarities between inspectors & specialists
- Enhance the internal benchmarking effect
- Inspectors are not judges & deciders
Experienced Inspectors

- Examination of the entity situation regarding Safety (organizational, technical, human factor …)
- Detection of operations & behaviors that may be detrimental to safety (weak signals, deviations, tendencies…)
- Dispositions based on examination of processes
Strategic and context-related thematic inspections

- 2006 Radioactive and hazardous materials transportation
- 2006 Services operations at customer facilities
- 2006/2007 Criticality risk control
- 2007 Radioactive waste management
- 2008 Radiation Protection for workers
- 2008/2009 Events: detection, analysis and operational feedback process
- 2009 Skills and qualification

A thematic inspection is performed on several sites representative of the different activities of the group allowing for generic lessons learned, including best practices than can be shared in all the group’s facilities.
Using the control as a tool for continuous improvement

Inspectors

- Formulate recommendations to the inspected entity, written as objectives to be reached in a facility specific report
- Make available, for all the entities, a summary of main findings for feedback purpose in a generic report

- The generic report may lead to the implementation of the recommendations & feedback for the entire group
  - Examples:
    - Creation of a network of sealed sources managers
    - Release of a transport directive
    - Revision of work operating processes
Safety specialists:
- Exchange lessons learned and best practices through a network of specialists on sites
- Leads and coordinates the implementation of AREVA's safety policy and/or regulations (through directives and guides when necessary)
- Represent the group in relation with stakeholders:
  - WG with Safety Authorities,
  - Other licensees: EdF, CEA....
  - Professional associations

Fields of specialists
- Waste safety
- Radiation protection of workers
- Environmental radiation protection
- Transportation
- Fire prevention
- Feedback experience
- Criticality
- External hazards
- Emergency preparedness
The internal reporting of events
**Internal reporting of events: the objectives**

- **Group commitment in the nuclear safety charter:**
  - “Nuclear events are evaluated in accordance with the International Nuclear Event Scale (INES) at all of the group’s facilities, even when this is not a regulatory requirement. Level 1 or higher events are put on record.”

- **Important source of experience feedback**
  - Especially for the fuel cycle facilities where no external structure, (such as WANO) exists
Internal reporting of events: the challenges

- How to rank events on the INES?
  - Information and training locally

- Which events are to be reported internally and then screened into INES?
  - Scope need to cover:
    - Nuclear Safety
    - Radiation Protection
    - Transportation of radioactive material
    - Environment for nuclear sites: radioactive or chemical release

  including situations where AREVA entity is not the licensee (operator for a licensee, services activities, transport)

  **BUT** criteria for declaring events to national or local authorities are different

- Possible misinterpretation by external stakeholders
Testing for a probation period of a common set of criteria based on the “French safety authority” criteria for nuclear entities worldwide

Experience showed that the main difficulty was to interpret the “nuclear safety” scale in the US

- Thanks to an extensive Corrective Action Program the data base exists, BUT screening remains a challenge:
  - Criteria for “defense in depth” are not black and white
  - There are significant differences in safety documentation (ISA vs SAR) and the notion of authorized operating regime (existence of OL&C)

- Dialogue between corporate in charge of collecting and sites is key to reach common understanding

Main interest is to exchange experience internally Cannot be used as an indicator to compare sites
Internal reporting of events: External Communication

- Reported annually in the SD report
- Results commented in the AREVA General Inspectorate annual report
- For more information see http://www.areva.com