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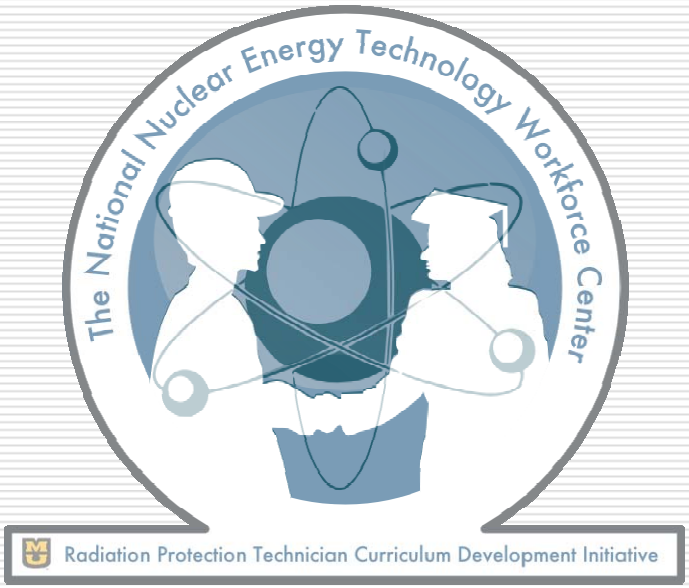
Radiation Protection Technician Curriculum Development Initiative - US DOL President's Energy Sector HGJTI Grant

Health Physics Society
2007 Annual Meeting

July 10, 2007
Portland, OR



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Co-Authors/Staff

William H. Miller, Gayla Neumeyer
MU NSEI/MURR

Chris Graham
Callaway Nuclear Power Plant

Dr. David Jonassen, Dr. Rose Marra, Matt Schmidt, Matt Easter,
Gelu Ionas, Geetika Agarwal
MU College of Education

Randy Etter, Bruce Meffert, Gary Nevels
Advanced Technology Center

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Background on DOL's High Growth Job Sector Training Initiative Grants in the Energy

- HGJTI program to prepare workers for high growth/demand, economically vital industries and sectors
- Goal to contribute to demand-driven workforce system in collaboration with private/public sector partners
- January 2006: Six Energy Sector HGJTI awards made:

  One in nuclear - to MU for Radiation Protection Technician curriculum and dissemination

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- **DOL Grant Overall Objective**
  - Develop and implement a two-year radiation protection degree program in response to well-documented, industry-identified need, for dissemination across the U.S.
- **DOL Grant Near-term Objective**
  - Development a curriculum featuring:
    - Scenario-based modules
    - Integrated web, class, labs, internship
    - Modeled self checking in form of “ASK” System

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- **Curriculum Features**
  - Two-year, technical degree program
  - Paid, average 4-month internship (typically with a utility)
  - Six new courses in RP
  - Tied to industry standards – ACAD, DOE
  - Scenario-based learning

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MU Department of Labor Grant "Players"

- University of Missouri-Columbia
  - NSEI / Nuclear Engineering
  - College of Education, Information Science and Learning Technology Program
- AmerenUE's Callaway Nuclear Power Plant
- Linn State Advanced Technology Center
- Institute for Competitive Workforce – U.S. Chamber of Commerce

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MU Department of Labor Grant "Players"

- DOL grant technical college – utility partners

Linn State Technical College	AmerenUE – Callaway
Central Virginia Community College	AREVA
Estrella Mountain Community College	Arizona Public Service Company – Palo Verde
MiraCosta Community College	Southern California Edison – San Onofre
Hill College	Texas Utilities – Comanche Peak

- Bartlett Nuclear, Inc.

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MU Department of Labor Grant Collaborators

- Nuclear Energy Institute
- Institute for Nuclear Power Operations
- Center for Energy Workforce Development (CEWD) – NEI collaboration
- National Laboratories
- Other technical school/utility partners who have expressed interest

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Linn State Technical College / Advanced Technology Center RP Technology Degree

- Initiated with DOE INIE funds
- Entering classes:
  - 2004 class - 9 students
  - 2005 class – 12 students
  - 2006 class – 14 students
  - 2007 class – 22 students
- QCT degree approved for funding by NRC
- Welding degree being considered

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Status of Linn State Program

Summer 2006 Graduates

- Braidwood NPP: 1
- Cooper NPP: 1
- Shearon Harris NPP: 1
- North Anna NPP: 1
- Bartlett Nuclear: 1
- Seeking MO Employment: 1

Student Internships:

Fall 2005 : 10 students, Callaway NPP (major outage)
Fall 2006: 8 students, Ft. Calhoun NPP (major outage)
3 students, Watts Bar NPP (major outage)
1 student, Callaway NPP

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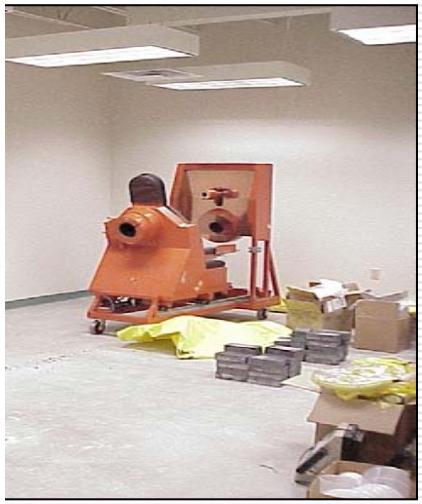
DOL Grant an Outgrowth of Linn State Advanced Technology Center Program



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Status of Curriculum Development

- Utilizing the Systematic Approach to Training (SAT)
- Focused on "what do RPs do?" at power plant, hospital, research/national lab, and isotope production facilities, integrating:
  - Procedures
  - Regulations
  - Experiences/event reports
  - Nuclear physics/chemistry
  - Detection
  - Equipment, etc.

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Utilizing an ASK system

- ASK System: A Simple Knowledgeable System
- Attempts to emulate a conversation with an expert
  - Web-based, question-driven dialogue between learner and system
  - Learners select from a constrained set of questions within the system and get pertinent answers, mostly in the form of stories

Radiation Protection Curriculum Project

Funded By

DOL # HG-15355-06

Back Top Forward Glossary Search Help

Scenario: Set up a radiological work area around a leaking valve.

Ask a question!

What radioactive source(s) or isotope(s) are present?

What will the workers do?

How/why do I perform this procedure?

How do I detect radiation levels?

- What kinds of surveys do I need to perform?
- What collection media (if any) would I use?
- What kind of detector should I use?
- How do I operate the detector?
- How do I calibrate the detector?
- How do I evaluate the results of the survey?

How do I protect the workers?

What standards, regulations, and guidelines apply?

How do I report this?

How certain am I about what I am doing?

What should I ask next?

What kinds of surveys do I need to perform?

Gary, an experienced radiation protection technician manager, describes the surveys one would need to perform.

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Why Use an ASK System?

- Facilitates access to expert knowledge
  - Structures expert RPT knowledge in much the same way as in the real world, i.e., by asking questions
- Provides for a learner-centric mode of learning
  - Learners actively construct knowledge by asking questions
- Grounds learning in the contexts of domain- and task-specific knowledge
  - Questions and answers are presented in the context of real world scenarios

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Why is this type of learning important?

- From a theoretical perspective, it advances higher-order cognition
  - **Situated learning**: focus on acquisition of knowledge and skills in socio-cultural contexts that model everyday situations in which knowledge is obtained and applied
  - **Activity theory**: focus on actual activities in which people engage while accounting for the tools, the social relationships, goals, and outcomes of those activities

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Why is this type of learning important?

- From an RPT perspective, it better prepares the learner for the workforce
- Memorization of facts and procedures comprises only a small part of the knowledge and skills an RPT must possess
- Moving beyond memorization toward higher levels of cognition improves performance in actual application of knowledge
- Addresses “lack of fundamentals knowledge”

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Status of Curriculum Development: Core RP Curriculum

- RPT 103 Radiation Fundamentals - Completed
- RPT 113 Radiation Monitoring – In Process
- RPT 223 Radiation Dosimetry - Formulated
- RPT 233 Radioactive Materials Handling - Formulated
- RPT 243 Radiological Safety and Response - Formulated
- RPT 253 Radiation Protection - Formulated
- RPT 290 Internship - Completed

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Comments on Internship

- Required part of curriculum
- Typically in the fall of the second year to coincide with outages
- Typical student stipend $10 - $15K
- ATC students have already received over $400K in internship salaries (used as industry match for DOL grant)
- Win - Win

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ACAD 93-008 Gap Analysis

9.02	**Radiation Detection and Measurement Principles**	
09.02.01	The basic theory of operation and operating characteristics of the following detectors:	
09.02.01.01	Geiger-Mueller	Radiation Detection (MNT 223)
09.02.01.02	scintillation	Radiation Detection (MNT 223)
09.02.01.03	proportional counter	Radiation Detection (MNT 223)
09.02.01.04	ion chamber	Radiation Detection (MNT 223)
09.02.01.05	fission chamber	Radiation Detection (MNT 223)
09.02.01.06	semi-conductor	Radiation Detection (MNT 223)
09.02.02	instrument efficiency, the factors that affect instrument efficiency, and calculation of efficiency from given information	Radiation Detection (MNT 223)
09.02.03	effects of background radiation	Radiation Detection (MNT 223)
09.02.04	differentiation between the operating characteristics of a radiation field survey instrument and a radioactive contamination survey instrument	Radiation Detection (MNT 223)
9.03	**Radiological Survey and Analysis Instruments**	
09.03.01	Explain the operating characteristics and basic electrical circuitry of each survey instrument	Radiation Detection (MNT 223)

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Summary: Impacts on Nuclear Industry

- Integrated, collaborative effort to maximize results
- Provide highly trained AAS degreed manpower for the nuclear industry (focusing initially on nuclear power facilities, broadening to national laboratories and other segments, such as hospitals, and manufacturing)
- Decrease training time for incoming RP technicians – a financial advantage to industry
- Internships integrated into curriculum provides OJT and resume-building for student

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Summary: Impacts on Nuclear Industry

- Emphasis on recruiting non-traditional student groups (women, minorities, veterans)
- Designed to complement accredited industry processes (benchmarked to ACAD, DOE, non-site specific training, etc.)
- New paradigm for training nuclear personnel using scenario-based education