



WELCOME, INTRODUCTIONS, AND ASSOCIATES PROGRAM OVERVIEW

Robin Gardner
October 6, 2011

TOPICS

- AGENDA
- APNTOWL & CEAR
ADMINISTRATIVE REPORT
- CEAR & APNTOWL TECHNICAL
REPORT



AGENDA, Thursday, Oct. 6th, 2011

- ❑ 1. (8:30) Welcome and Associates Program Overview – Robin Gardner (RG)
- ❑ 2. (8:40) Description of Associates Program Operation – RG
- ❑ 3. (8:45) Status of Cluster, CEAR Computer Codes, and Idea on Using Web to Fund Use of Codes – Adan Calderon (AC) and Johanna Peeples (JP)
- ❑ 4. (8:55) Optimization Studies on PGNAA Coal Analysis, Improvement for Patent Development – Jiaxin Wang (JW) and RG
- ❑ 5. (9:20) Application of the MCLLS Approach to Cargo Monitoring – Cody Peeples (CP) and Wes Holmes (WH)
- ❑ 6. (9:35) Overview of Spectroscopic Analysis Methods Used in Nuclear Security Applications – John Mattingly (JM)

(10:00) COFFEE BREAK



AGENDA, 2

- 7. (10:15) MCNP Status and Developments and Report on Project “Piezoelectric Transformer Neutron Generator (PTNG) Neutron Source for Well Logging” – Greg Dale (GD) ([LANL Project](#))
- 8. (10:45) Detector Response Function Development by using modified MCNP and the Simple Electron Range Codes – ZW, JW, and WH ([Baker Project](#))
- 9. (11:00) Automating Spectrum Stripping – RG and WH ([EXXON Mobil Project](#))
- 10. (11:10) Evaluating MCNP5 Data for Elements/Isotopes in Well Logging Practice – JW ([Halliburton Project](#))
- 11. (11:20) Monte Carlo Simulation of the Nonlinear Full Energy Peak Energy Responses for Gamma-Ray Scintillation Detectors – JP and RG
- 12. (11:25) NNSA/DOE Contract: Development of Accurate and Fast Monte Carlo Spectral Simulation Algorithms for Proliferation – RG with Discussion

(11:45) LUNCH



AGENDA, 3

(12:45) LAB TOUR

- ❑ 13. (1:15) NNSA/DOE Contract: Production of Gamma-Ray Spectral Libraries for Cargo Monitoring – CP and RG
- ❑ 14. (1:35) NERI-C Contract: Radioactive Pebble Tracking Using Both Collimated and Uncollimated Detectors and Stochastic Modeling - ZW and Kyoung Lee (KL)
- ❑ 15. (2:00) On the Recent Activity in Fluid Analysis by Prompt Gamma Ray Neutron Activation Analysis (PGNAA) - Ilker Meric (IM) and/or RG
- ❑ 16. (2:15) Current Oil Well Logging Tools; Can we do more? - RG



AGENDA, 4

(2:25) EXISTING CONTRACTS

- ❑ 1. NERI-C Radioactive Particle Tracking and Monte Carlo Simulation in PBR's (DOE)
- ❑ 2. Development of Accurate and Fast Monte Carlo Spectral Simulation Algorithms for Proliferation Detection (NNSA/DOE)
- ❑ 3. Production of Gamma-Ray Spectral Libraries for Nuclear Threat Cargo Monitoring (NNSA/DOE)
- ❑ 4. Development of an Inverse Radiation Transport Modelers' Toolkit (NNSA/DOE) - John Mattingly, PI



AGENDA, 5

(2:30) OUTSTANDING PROPOSALS

- ❑ 1. NEUP Proposal (DOE): A Comprehensive Benchmark Experimental Study of Pebble Movement in PBRs - \$1.2M for four years (with INL)
- ❑ 2. DNDO Proposal (Homeland Security): Inverse Gamma-Ray Coincidence Spectroscopic Analysis for Nuclear Threat Detection and Identification - \$2.43M for five years (with STL)

(2:35) PLANNED PROPOSALS

- ❑ 1. Adding the MCLLS Approach to GADRAS ([Sandia](#))
- ❑ 2. Using PGNAAs for Sorting Alloys ([Alcoa](#))
- ❑ 3. Design of a Device for Measuring H, Cl, and S in Pumped Oil ([Saudi Aramco](#))



AGENDA, 6

**(2:40) Future Associates Program Research
– Open Discussion**

(3:15) ADJOURNMENT

**Friday, October 7, 2010
INDIVIDUAL MEETINGS
CAN BE SCHEDULED**



APNTOWL & CEAR ADMINISTRATIVE REPORT

MEMBERSHIP

- Present: Baker Atlas, Weatherford, EXXON Mobil, Halliburton, and LANL – Pathfinder dropped out
- Future: Saudi Aramco(?), Real Time Instruments(?), CarboCeramics(?) and Others(?) → need more oil companies - especially nationalized ones

PERSONNEL

- PhDs Graduated: Jiaxin Wang, Zhijian Wang, Kyoung Lee, and Huawei Yu (China University of Petroleum)
- MS Graduated: Vincent DiNova
- PhD Students: Cody Peeples* **, Andy Li* (at LANL), Ilker Meric (University of Bergen, Norway), Wesley Holmes, Adan Calderon - *Will graduate in December - **Will be Post Doc
- Post Doctoral (Research Associate): Johanna Peeples, Z. Wang, and K. Lee
- Faculty: John Mattingly

EXPENDITURES



APNTOWL & CEAR ADMINISTRATIVE REPORT, 2

□ OTHER FUNDING

- DOE NERI-C (Zhijian Wang, Kyoung Lee, and Jiaxin Wang) → Ending fourth year which was no cost extension
- DOE NNSA Contract 1 (Cody and Johanna Peeples and Wes Holmes) → Ending third year – will have no cost extension
- DOE NNSA Contract 2 (Johanna Peeples, Wes Holmes, Vincent DiNova, Adan Calderon
- Consulting with Hexion (now Momentive) on use of inert tracers in hydraulic fracture logging (w/Zhijian Wang)
- Consulting with Real Time Instruments (Australia) on the design of a new PGNAA Coal Analyzer (w/Zhijian Wang)
- Possible consulting with Saudi Aramco



APNTOWL & CEAR ADMINISTRATIVE REPORT, 3

- **OUTSTANDING PROPOSALS:**
 - Homeland Security on adding coincidence counting for nuclear threat detection and identification - \$2.43M for five years with STL
 - NEUP on a benchmark experimental study of pebble movement in PBRs - \$1.2M for four years with INL
- **PLANNED PROPOSALS:**
 1. Adding the MCLLS Approach to GADRAS (with Sandia)
 2. Using PGNAA for Sorting Alloys (with Alcoa)}
 3. Design of a Device for Measuring H, Cl, and S in Pumped Oil (with Saudi Aramco)



APNTOWL & CEAR ADMINISTRATIVE REPORT, 4

PUBLICATIONS

- ❑ 305. I. Meric, G.A. Johansen, M.B. Holstad, R.P. Gardner, “Monte Carlo modeling of gamma-ray stopping efficiencies of Geiger-Mueller counters”, *Nuclear Instruments & Methods in Physics Research A*, 636, pp 61-66 (2011).
- ❑ 306. Huawei Yu, Jianmeng Sun, Jiaxin Wang, and Robin P. Gardner, “Accuracy and borehole influences in pulsed neutron gamma density while drilling”, *Applied Radiation and Isotopes*, (2011).
- ❑ 307. Jiaxin Wang, Adan Calderon, Cody R. Peeples, Xianyun Ai, and Robin P. Gardner, “Monte Carlo Investigation and Optimization of Coincidence Prompt Gamma-Ray Neutron Activation Analysis”, *Nuclear Instruments & Methods in Physics Research A*, 652, 572-577 (2011).



APNTOWL & CEAR ADMINISTRATIVE REPORT, 5

PUBLICATIONS, cont.

- ❑ Several publications are pending in the proceedings of the SORMA topical
- ❑ Several publications are pending in the proceedings of the IRRMA topical



APNTOWL & CEAR ADMINISTRATIVE REPORT, 5

SUBMITTED PAPERS

- Robin P. Gardner, Fusheng Li, and Jorge Fernandez, “Use of the CEARXRF GUI-Based Monte Carlo - Library Least-Squares (MCLLS) Code for a Micro-focused EDXRF Analyzer”, presented at **EXRS** and submitted for publication in Gamma-Ray Spectroscopy
- Robin P. Gardner, Fusheng Li, and Jorge Fernandez, “Implementation of a new Si (Li) detector response function (DRF) for Results from a Microfocussed HDXRF analyzer”, presented at **EXRS**



APNTOWL & CEAR ADMINISTRATIVE REPORT, 6

SUBMITTED PAPERS, 2

- Thomas Wesley Holmes, Adan Calderon, Cody R. Peeples, and Robin P. Gardner, “A Proposed Benchmark Problem for Cargo Nuclear Threat Monitoring”, presented at **SORMA** and submitted for publication in **NIMA**
- Robin P. Gardner, Xianyun Ai, Cody R. Peeples, Jiaxin Wang, Kyoung Lee, Johanna Peeples, and Adan Calderon, ”Use of an Iterative Convolution Approach for Qualitative and Quantitative Peak Analysis in Low Resolution Gamma-Ray Spectra”, presented at **SORMA** and submitted for publication in **NIMA**



APNTOWL & CEAR ADMINISTRATIVE REPORT, 7

REVIEWS, CONFERENCES, PRESENTATIONS, & AWARDS

- Attended and Presented Report on NNSA/DOE Contracts at University & Industry Technical Interchange (UITI) Review Meeting at University of Tennessee, Knoxville, TN on December 7-9, 2010.
- Reviewed (by phone) NA-22 Contract with PNNL entitled “Energy Resolution”, at Richland, WA on February 18, 2011.
- Will Attend and Present Report on NNSA/DOE Contracts at University & Industry Technical Interchange (UITI) Review Meeting at Livermore, California on December 6-8, 2011.
- Attended with a Post-Doc and ten graduate students the IRRMA8 Meeting sponsored by Kansas State University (held in Kansas City) on June 26 – July 1, 2011, where 12 papers were presented.
- Attended IRPS Council Meeting at IRRMA8 to discuss the possibility of IRRMA administratively joining ISRP to form IRPMAS.



CEAR & APNTOWL TECHNICAL REPORT, 1

- ❑ NERI-C (DOE) Grant: “A Research Program on Very High Temperature Reactors (VHTR’s) with University of Missouri” – Columbia and Washington University (St. Louis) – Three Years (extended by one year) - \$900,000
- ❑ NNSA/DOE Contract: “Development of Accurate and Fast Monte Carlo Spectral Simulation Algorithms for Proliferation Detection” – Three Years - \$860,000 (included \$275,000 for LANL and PNNL)
- ❑ NNSA/DOE Contract: “Production of Gamma-Ray Spectral Libraries for Cargo Monitoring” – Three Years - \$900,000



CEAR & APNTOWL TECHNICAL REPORT, 2

□ APNTOWL:

- Increase the sensitivity of **C/O** tools by use of the MCLLS approach with compound libraries such as H₂O, NaCl, CH₂ (Oil), CaCO₃, SiO₂, etc. for **Baker**
- Develop a semi-empirical model for the **density tool** that includes composition as well as density for **all members**
- Investigate the differences in cross sections available for MCNP5 usage for **Halliburton**
- Develop a mathematical algorithm for spectrum stripping for **LLS** purposes for **EXXON Mobil**
- Investigate the Prompt Gamma-Ray Tool as a **Density Measurement Approach** for **EXXON Mobil**
- Investigate **combining** the responses of a **number of nuclear tools** to obtain added information for **all members**
- **Others?**

