



WELCOME, INTRODUCTIONS, AND ASSOCIATES PROGRAM OVERVIEW

Robin Gardner
October 3, 2008

TOPICS

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



AGENDA, 1

- ❑ 1. (8:30) Welcome and Associates Program Overview – Robin Gardner (RPG)
- ❑ 2. (8:40) Description of Associates Program Operation – RPG
- ❑ 3. (8:45) Status of Computers (Clusters) and CEAR Computer Codes – Cody Peeples (CP), Dan Speaker (DS), Fusheng Li (FL), Jiaxin Wang (JW), and RPG
- ❑ 4. (8:55) Code Package Developments for the Monte Carlo – Library Least-Squares (MCLLS) Approach for EDXRF and PGNA and for Pulse Pile-Up Correction – FL, Xiaogang Han (XH), and RPG
- ❑ 5. (9:10) IRRMAVII Paper: A Study on Replacing Am-Be Sources with Cf-252 or 14-MeV Neutrons – CP and RPG
- ❑ 6. (9:25) Optimizing the Bulk Analysis and C/O Log Patent Ideas – JW and RPG
- ❑ (9:45) **COFFEE BREAK**



AGENDA, 2

- ❑ 7. (10:00) MCNP Status and Developments – Avneet Sood (AS)
- ❑ 8. (10:20) Detector Response Function Development for MCNP Use – Zichian Wang (ZW), DS, FL, and RPG
- ❑ 9. (10:40) IRRMAVII Paper: New Model for the Gamma-Ray Density Log – RPG
- ❑ 10. (10:50) Methods for Obtaining and Using Differential Operators in MCLLS Approach for Cargo Monitoring – Hany Abdel-Khalik, (HA), FL, XH, DS, CP, and RPG
- ❑ 11. (11:10) NERI-C Contract: Radioactive Particle Tracking for PBR's – ZW and Kyoung Lee (KL)
- ❑ (11:30) **LUNCH**
- ❑ 12. (12:30) On-Line Pulse Pile-Up Correction – Paul and David Scoullar of Southern Innovation



AGENDA, 3

- 13. (12:50) Raytheon Contract: Improving the Inverse Cargo Monitoring Treatment – DS and RPG
- 14. (1:05) IRRMAVII Paper: On the Future of Monte Carlo Simulation for Nuclear Logs – RPG and AS
- 15. (1:25) Current Oil Well Logging Tools; Can we do more? – RPG

(1:40) PROPOSALS: Accepted (A), Outstanding (O), and In Preparation (P)

1. The Inverse Treatment for Radioactive Cargo Monitoring (Raytheon) **A**
2. NERI-C Radioactive Particle Tracking in PBR's (DOE) **A**
3. A Replacement Treatment for GADRAS for SNR Cargo Monitoring (NNSA/DOE) **A**
4. A General Inverse Treatment for Radioactive Cargo Monitoring (NSF/Homeland Security) **O**
5. NSF Center Proposal on Carbon Measurement in Soils **P**



AGENDA, 4

(2:00) Future Associates Program
Research – Open Discussion

(2:30) ADJOURNMENT

INDIVIDUAL MEETINGS

(3:45) Refreshments for Seminar and
Seminar at 4:00 by Medhat Mickael



APNTOWL & CEAR ADMINISTRATIVE REPORT, 1

□ MEMBERSHIP

- Present: Baker Atlas, Weatherford, EXXON Mobil, Halliburton, Pathfinder, and LANL
- Future: Shell, ConocoPhillips, ChevronTexaco, Others(?) – need more oil companies

□ PERSONNEL

- Graduated: Libai Xu and Fusheng Li
- PhD Students: Cody Peeples, Z. Wang, Dan Speaker, J. Wang, and Kyoung Lee
- M.S. Student: Robert Cox

□ EXPENDITURES



APNTOWL & CEAR ADMINISTRATIVE REPORT, 2

□ OTHER FUNDING

- Raytheon Contract (Cody Peeples, Dan Speaker) → Beginning second year
- DOE NERI-C (Fusheng Li, Zichian Wang, and Jiaxin Wang) → Beginning second year
- DOE NNSA Contract (D. Speaker, Cody Peeples) → Beginning soon

□ OTHER PLANNED PROPOSALS:

- Homeland Security on a General Inverse Approach
- NSF Center in collaboration with Lucian Wielopolski

FORGET NIH!



APNTOWL & CEAR ADMINISTRATIVE REPORT, 3

PUBLICATIONS

287. Xiaogang Han and Robin P. Gardner, “The Monte Carlo Code CEARCPG for Coincidence Prompt Gamma-Ray Neutron Activation Analysis”, *Nuclear Instruments and Methods in Physics Research B*, 263, pp. 320-325, 2007.
288. Sang Hoon Lee, Moosung Jae, and Robin P. Gardner, “Non-Poisson Counting Statistics of a Hybrid G-M Counter Dead Time Model”, *Nuclear Instruments and Methods in Physics Research B*, 263, pp. 46-49, 2007.
289. Libai Xu and Robin P. Gardner, “Prompt Gamma-Ray Imaging”, *Transactions of the American Nuclear Society*, Vol. 97, pp. 463-464, TANSO 97 1-952 (2007).
290. J.A. Kusilek, J.K. Hartwell, M.E. McIlwain, and R.P. Gardner, “Design and Preliminary Monte Carlo Calculations of an Active Compton-Suppressed LaBr₃(Ce) Detector System for TRU Assay in Remote-Handled Wastes”, *Nuclear Instruments and Methods A*, 580, 226-229, 2007.



APNTOWL & CEAR ADMINISTRATIVE REPORT, 4

291. Robin P. Gardner, “Modification of the Monte Carlo - Library Least-Squares (MCLLS) Inverse Analysis Approach for Cargo Radiation Monitoring Applications”, Transactions of the American Nuclear Society, Vol. 98, pp.581-582, 2008.
292. Zhijian Wang, Daniel P. Speaker, and Robin P. Gardner, “Two Monte Carlo Approaches for the Generation of Scintillation Detector Response Functions (DRF's)”, Transactions of the American Nuclear Society, Vol. 98, pp.585-586, 2008.
293. Jiaxin Wang, Fusheng Li, and Robin P. Gardner, “On the use of prompt gamma-ray neutron activation analysis for determining phase amounts in multiphase flow”, Measurement Science and Technology, 19, 6pp (2008).
294. Fusheng Li, Weijun Guo, and Robin P. Gardner, “Implementation of the Monte Carlo - Library Least-Squares Approach to Energy Dispersive X-Ray Fluorescence Analysis”, Advances in X-Ray Analysis, Volume 51, 9 pages (2007).
295. Jiaxin Wang and R.P. Gardner, “Optimizing the Design of a Coincidence PGNA System for Bulk Analysis”, ANS Fall Meeting (2008).



APNTOWL & CEAR ADMINISTRATIVE REPORT, 5

CONFERENCES AND PRESENTATIONS

- Presented and Co-authored another paper at the annual American Nuclear Society meeting in Anaheim, CA in June 2008.
- Presented two and co-authored another paper at the IRRMA-VII Conference in Prague, the Czech Republic in June 2008. Also Chaired a session. Cody Peebles presented one of the papers.
- Presented a paper (co-authored by Fusheng Li) at the Denver X-Ray Conference in Denver in August 2008.
- Co-Author with Libai Xu of paper based on his PhD thesis on “Prompt Gamma-Ray Imaging” that won the Mark Mills Award for 2007 and was presented at the **ANS Meeting** in Washington, DC in November, 2007.



CEAR & APNTOWL TECHNICAL REPORT, 1

- ❑ **Raytheon Contract: “Developing an Inverse Approach to Monitoring for Special Nuclear Materials” – Two Years - \$200,000**
- ❑ **NERI (DOE) Grant: “A Research Program on Very High Temperature Reactors (VHTR’s) with University of Missouri” – Columbia and Washington University (St. Louis) – Three Years - \$900,000**
- ❑ **NNSA/DOE Contract: “Development of Accurate and Fast Monte Carlo Spectral Simulation Algorithms for Proliferation Detection” – Three Years - \$860,000 – Accepted - will be in place very soon**
- ❑ **NSF/DNDO Proposal: “Development of a Monte Carlo-Based Approach for Domestic Nuclear Detection” – Five Years - \$2,000,000 - Pending**



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**
- Develop a mathematical algorithm for stripping for **LLS** purposes for **EXXON Mobil**
- Investigate **combining** the responses of a **number of nuclear tools** to obtain added information for **all members**
- GAMRES Patch Implementation into MCNP5 from MCNP4 for **Halliburton**
- Others?

