

Transportation Security Laboratory  
 Wm. J. Hughes Technical Center  
 Building 315  
 Atlantic City IAP, NJ 08405



# Homeland Security

June 4, 2009

Dennis Lawyer  
 NRC Region 1  
 FAX: 610-337-5269

J-6  
 29-13141-06  
 03030808

Dear Mr. Lawyer:

Enclosed please find the course outline and associated training certificates for Dr. Curtis J. Bell. He is to become the new Radiation Safety Officer for the Transportation Security Laboratory (TSL), located in southern New Jersey. In addition to this training, Dr. Bell did his graduate work at Rutgers University in Nuclear Physics using a small (8 MV Van der Graaff) accelerator.

In terms of his use of radioactive materials, all use to date has been as a user and not the license holder (or RSO). He does not have the specific activities of the check sources. Most of his experience has been using this radiation to calibrate another radiation detector, that would then be used to investigate physical phenomena or for use in material analysis.

#### Background Experience:

Graduate school Rutgers (1979-1986):

- Check sources (microCi) –  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{22}\text{Na}$
- Accelerator produced radiation  $^{13}\text{C}$  on  $^{124}\text{Sn}$  target, non-measureable residual radiation

TSL (1990 – present) – all of these uses have been periodic (e.g. a frequency of 1-2 times/year)

- Check sources (microCi) –  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{22}\text{Na}$
- $^{63}\text{Ni}$  (15 mCi)
- Radiation resulting from neutron interactions (other entities were the license holders) with non-measureable residual radiation
- X-ray radiation from cabinet safe x-ray systems

If you need additional information, please contact Dr. Bell at 609-813-2753 or by email at [curtis.bell@dhs.gov](mailto:curtis.bell@dhs.gov).

Sincerely,

Susan F. Hallowell, Ph.D.  
 Director

143536

NMSS/RGN1 MATERIALS-002

## Theory Review

- Atomic Structure
- Nucleus
- Fundamental Properties
  - Mass, Charge, Energy, Force
  - Electrical & Chemical
- Nuclear Force
- Radiation
  - Definition
  - Types of Radiation
- Radioactivity
  - Definition
  - Units of Measure
  - Half Life & Decay Law
- Interaction of Radiation with Matter
  - Penetrating Radiation
  - Non-Penetrating Radiation
    - Charged Particle interactions
    - coulomb Forces
    - Radiative Losses
  - Gamma & X-ray Interactions
    - Photoelectric Effect
    - Compton Scattering
    - Pair Production
- Radiation Exposure and Dose
  - Exposure
  - Absorbed Dose
  - Dose Equivalent
  - Total Effective Dose Equivalent, TEDE
  - Committed Effective Dose Equivalent, CEDE
  - Deep Dose Equivalent, DDE
- Background Radiation Exposure
  - Natural Sources
  - Technologically Enhanced Sources
- Biological Effects of Radiation
  - Background
  - Sequential Patterns of Biological Effects
  - Cellular Effects
  - Types of Exposure
    - Acute
    - Chronic
  - Types of Biological Effects
    - Short Term Effects
    - Long Term Effects

- Genetic Effects
- Federal Exposure Limits and Risk Estimates
- X-Ray Machines
- Components
- Basics (kVp, mA, time, photolimits)
- Safety Tests (filtration, collimation, alignment, reproducibility, accuracy, exposure at skin entrance)

## **Radiological Hazards Review**

- External Radiation Dose
  - Penetrating (gamma)
  - Non-Penetrating (beta)
  - Rules of Thumb
  - Time, Distance, Shielding
- Internal Radiation Dose
  - Units of Measure
  - Fixed vs Removable Contamination
  - Internal Hazards and Entry Routes
  - Airborne Radioactivity
  - Protection Methods

## **Radiation Detection Review**

- Basic Principles
  - Gas Filled Detectors
  - Scintillation Detectors
  - Solid State Detectors
- Applications
  - Detector Efficiency
  - Counting Statistics
  - Minimum Detectable Activity
- Dose and Dose Rate Measurements
  - Dose Rate Meters
  - Dosimeters
- Contamination Measurements
  - Direct Methods (Friskers)
  - Indirect Methods
  - Swipes
  - Laboratory Instruments

## **Licensing of Radioactive Material**

- Exempt, General Licenses, Specific Licenses
- 10CFR30 - General Applicability to Domestic Licensing
- Decommissioning Funding Plans
- Licensing Process (initial application, amendments, renewals, change of name/ownership)
- 10CFR31 - General Licenses
- 10CFR32 - Specific Licenses to Manufacture or Transfer
- 10CFR33 - Broad Scope
- 10CFR34 - Industrial Radiography

- 10CFR35 - Medical Uses
- 10CFR36 - Irradiators
- 10CFR39 - Well Logging
- 10CFR40 - Licensing of Source Material
- Reciprocity
- Sealed Source and Device Evaluations
- Radioactive Material Licenses
- Types
- Regulatory Agencies
- Agreement States
- Compatibility
- License Conditions
- Name, address, expiration date, license number
- Radioactive Material, Chemical/Physical Form, Possession Limits, Authorized Uses
- Location of Use, Authorized Users, RSO, Leak Test Requirements, Inventories, Prohibitions & Authorizations
- Tie-Down Condition
- Example Licenses and Workshop Session
- Regulatory Control and Compliance
- 10CFR19
- Posting of Notices to Workers
- Instructions to Workers
- Notifications and Reports to Individuals
- Inspections
- 10CFR20 - Radiation Protection Standards
- Radiation Protection Programs and Audits
- Occupational Dose Limits
- Dose Limits for Members of the Public
- Surveys and Monitoring
- Control of External Exposure
- Respiratory Protection
- Waste Disposal
- Records & Reports
- Regulations Workshop Session
- Operational Radiation Safety Programs
- Organization
- Facility Design
- Radiation Safety Program Goals
- General Public
- Radiation Workers
- Personnel Monitoring
- ALARA
- Radioactive Material Control
- Access Control
- Surveys and Facility Monitoring
- Effluent Monitoring and Control
- Waste Disposal and Effluent Releases

## **Annual Radiation Protection Program Audits**

- Purpose of Assessments
- Types of Assessments

- Preparations for Assessments
- Conducting Assessments
- Documentation
- Lessons Learned

## Emergency Plans

- The Role of Federal, State, and Local Agencies
- General Rules for Health Physicists and RSOs

## Transportation of Radioactive Material

- Title 49 - Department of Transportation
- Reference Materials
- NRC Homepage
- NRC Information Notices List
- Examples provided depend on class attendees and their license type
- NRC Regulatory Guides
- Examples provided depend on class attendees and their license type
- Examples Sealed Source and Device listings

## NRC Health Physics Position Papers

## NRC 10CFR20 Questions and Answers(Nureg/CR-6204)

## Optional Textbook - Handbook of Health Physics and Radiological Health

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### Radiation Safety & Control Services, Inc.

91 Portsmouth Ave Stratham, NH 03885

Phone: 1-800-625-8339

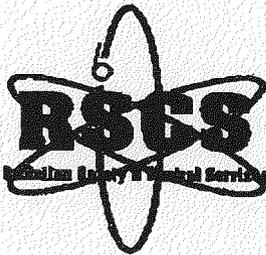
Email: [info@radsafety.com](mailto:info@radsafety.com)

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Radiation Safety & Control Services, Inc.  
Awards this certificate to

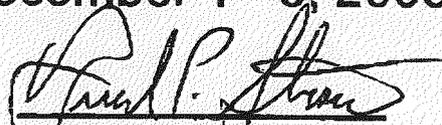
**Curtis Bell**

in recognition of satisfactory completion of our 40-hour  
**Radiation Safety Officer Training  
Course**



Las Vegas, Nevada  
December 1 - 5, 2008



  
Frederick P. Straccia, CHP

This course has been approved for 40, Category A, CE credits (reference number NHZ0183001) by the ASRT Dept. of Education.

NOTE: This class satisfies the Department of Transportation requirements listed in Title 49 CFR parts 172 subpart H and expires three years from the date listed above.