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US test in Nevada

Soviet test in Arctic Ocean

The Birth of Safeguards

Dr. T. Douglas Reilly

50 Years of Safeguards at LANL 1966-2016

Norris E. Bradbury, the Lab's second director, died at his home in Los Alamos Aug. 20. Shown above, Bradbury escorts his predecessor, J. Robert Oppenheimer, right, through the science museum during a 1964 visit by Oppenheimer.

Bob Keepin, Norris Bradbury, Sigvard Eklund, 1969

50 Years of Safeguards at LANL 1966-2016

President Eisenhower's UN Speech of 8 December 1953 (proposed IAEA)

IAEA at Vienna International Center (VIC)

Photo during 2004 aurora display

Son of a Preacher, Bob Keepin was a Great Salesman!

Cockcroft-Walton Accelerator at Pajarito Site Measuring Spent MTR Fuel Assembly

Regular Meeting between CMB and N-6

Munson Thorpe, N-6, illustrates a point during one of the regular monthly meetings of the N-6-CMB Nondestructive Assay committee. In foreground are L. Philip Reinig, Engineering department head, and Richard D. Baker, CMB-division leader. At left of table are Alfred C. Dumrose, CMB-8 alternate group leader; Carl Henry and Larry East,

both N-6; and Charles Metz, CMB-1 group leader. At right are William Maraman, CMB-11 group leader; Alan Berick, Ronald Augustson, and Roddy Walton, all of N-6; Robert Hendron ENG-6 group leader; Joerg Menzel, N-6; and G. Robert Keepin, N-6 group leader. Not shown is N-Division Leader Roderick Spence.

MONAL at Twilight at DP-Site

MONAL at K-25 Oak Ridge

SAM-2 with Digital Rate Multiplier (DRM) First Commercial NDA Instrument

First SGS

Used in MONAL - 1971

Ray Martin with first computer-driven SGS

Jack Parker's lab

K-Edge Densitometry with x-ray Generator: Tom Canada, Jack Parker, Doug

First of many instruments to Japan

50 Years of Safeguards at LANL 1966-2016

Original Cerenkov Viewing Device (CVD) by N-2

Tom Atwell measures holdup at uranium shop

50 Years of Safeguards at LANL 1966-2016

High Level Neutron Coincidence Counters

Mel Stephens with early shift-register circuit

**Klaus
Böhnel
Inventor**

Shift-Register Evolution

Active Well Coincidence Counter (AWCC)

Howard & Collar in
Resende, Brazil

Neutron Coincidence Counter Family Tree

Neutron Assay Applications Tree

Dick Siebelist (Q-3) checks NCCs at TA-55

SUPPORT TO IAEA POTAS

- NPT takes effect 1970
- First REVCON 1975
- Glenn Amendment 1976-77
- Nuclear Non Proliferation Act of 1978 (NNPA)
- Program of Technical Support to Agency Safeguards (POTAS)
- International Safeguards Projects Office (ISPO-BNL)
- SSAC and PP training courses

First Four Safeguards Group Leaders 20th Anniversary

Training in Nondestructive Assay of SNM

- 3-5 DOE courses/y
- 2 IAEA courses/y
- 1 SSAC course/2 y
- 15-20 Russian courses/year
- ad-hoc training

NDA for IAEA Inspectors - 1982

Shirley
Johnson
& Alberto
Barocas

Heavy Security ala 1986 at Schoolhouse

Ron Augustson

Mike Baker

Arnie Hakkila

Ken Sanders

IAEA Inspection Exercise at Hanford Engineering Development Lab (HEDL), 1983

HEU Physical Inventory Verification Exercise, September 1985

Ollie Heinonen
DDG - SG

Reza Abedin-
Zadeh SH-TNS

Kaluba
Chitumbo
Dir-SGOA

First LANL SSAC course, April 1980, at Bishop's Lodge

Bob Keepin at 1985 SSAC, First PRC Participants

SSAC 1987 **Norris Bradbury (LANL 2nd Director)**

Ladies of 1987 SSAC

Miriam
Brazil

Sonia
Argentina

Asmaa
Egypt

Mirta
Argentina

Hendaryah
Indonesia

Aysun
Turkey

Genowefa from Poland missed the photo

50 Years of Safeguards at LANL 1966-2016

1988 Latin American SSAC in Brazil

Bariloche, Argentina – 1990 Latin American SSAC

Puerto Montt, Chile
– Curanto (yum)

Cascata de Iguazu – Argentina/Brazil

1st Weekend 1991 SSAC: Carlsbad Caverns

White Sands

Alamogordo Space Museum

Dash-7 for SSAC-1991 2nd Weekend

Grand Canyon

ANF Fuel Assemblies

Training is Fun!

50 Years of Safeguards at LANL 1966-2016

ICAS-48, Introductory Course in Agency Safeguards

**Phil is back; Mark, Diana & Anthony are
there, Mike goes soon**

50 Years of Safeguards at LANL 1966-2016

**PASSIVE
NONDESTRUCTIVE ASSAY
OF NUCLEAR MATERIAL
(PANDA)**

United States
Nuclear Regulatory Commission

**Passive Nondestructive Assay
of Nuclear Materials**

Doug Reilly, Norbert Enselin, Hastings Smith, Jr.,
and Sarah Kreiner

Calorimeters

Dave's Solid State Drum Calorimeter

Transportable Drum Calorimeter

50 Years of Safeguards at LANL 1966-2016

Ed Adams with Billet Shuffler - 1992

This measured U metal billets at SRS before extrusion into fuel tubes for production reactors.

50 Years of Safeguards at LANL 1966-2016

Tom and Greg Walton examine the SES Robot

Technical Support of Nonproliferation on an International Scale

Russia, Former Soviet Union: Nuclear Safeguards Upgrades

Korea:
Improved safeguards,
special inspections

IAEA, Euratom:
Traditional
Safeguards
Inspections

Iraq:
Special
Inspections

**Davidson
PMCA**

IAEA Inspectors in Iraq – 1992

examining EMIS parts

Many inspectors LANL-trained, some LANL experts

Training ROK Specialists to Inspect the North - 1992

서울 Seoul

NDA Instruments in Russian & NIS Facilities

50 Years of Safeguards at LANL 1966-2016

Hasty and Friend in Moscow ~1996

BN-350, Aqtau, Kazakhstan

Shirley gives software training

50 Years of Safeguards at LANL 1966-2016

International Safeguards Activities

Los Alamos

Los Alamos National Laboratory, Nuclear Safeguards Research and Development

9/2/194

34 countries

50 Years of Safeguards at LANL 1966-2016

53

300 years of safeguards experience

50 Years of Safeguards at LANL 1966-2016

May Rainbows Stay Over Ten Site (TA-35)

It takes all colors to make a rainbow
And each eye sees a different rainbow
It takes all people to make a world
And each eye adds perspective and depth