



# Solutions to Resuming Radiation Safety Programs At Restart Of Inactive Uranium Recovery Operations

Stanley A. Fitch, CHP, MSE  
Vice President  
Trinitek Services, Inc.

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**Trinitek Services, Inc.**

*Nuclear, Environment, Safety and Security  
Consulting and Training Services*

<http://www.3tks.com/>

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# About Trinitek Services

An 8(a) SBA-certified business located in New Mexico.

We are nuclear, environmental, safety & security consultants.



# About Trinitek Services

We assist our clients in the control, regulation, and security of nuclear materials and radiation for the safety of workers, the public, and the environment.



High-Consequence Source Training for Students from the Egyptian Atomic Energy Authority (EAEA)

We gladly assist clients across America and throughout the world.

# About Trinitek Services

Our clients include organizations that own, regulate, or are otherwise involved with uranium mines, mills, and ISR facilities.



Our staff includes nuclear scientists, nuclear engineers, hydrogeologists, health physicists, radiation biologists, industrial hygienists, NEPA lawyers, educators, and security experts. Many of our staff are former regulators.

# Presentation Topics

Safety Culture & Philosophy

Radiation Safety Program Scope

State Of The Facility And Operations

Hire And Use A Good Radiation Safety Staff

Develop A Comprehensive Program

ALARA Is A 5-Letter Word

Tips On Interacting With Regulators



# Safety Culture & Philosophy

## Radiation Safety Culture – Policies and Politics

- In your opinion, what defines a good safety culture? Can you think of particular work-related experiences?
- The opinion varies between regions, politicians, regulatory agencies, companies, those who oppose the nuclear industry, the people in this room. It varies according to perceptions of risk.
- Nevertheless, a sound safety policy is necessary for the development of an adequate and appropriate radiation safety program. It **MUST** start with top management and then on to middle management.

# A Tale of Two Dichotomies

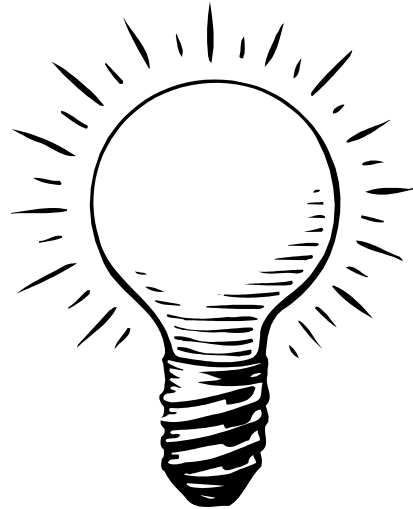
“Radiation is a carcinogen. Uranium is toxic. The uses of nuclear materials is killing people and is irreversibly destroying the environment. The uranium industry must be stopped NOW.”



“Look, I worked at uranium mines for 30 years and nothing has ever happened to me. Besides, this is a business. Businesses must maximize their profits. I appreciate my workers and the environment, but I have shareholders to satisfy too. My main consequence of concern is profitability.”

# Radiation Safety Policy

The goal of radiation safety and safeguards is to control the beneficial uses of ionizing radiation, while providing for protection against intrinsic hazards that it can pose to workers, the public, and the environment.



This concept is the foundation of a good radiation safety policy for both industry and government.



# Congressional Policy for the AEA

Atomic Energy Act of 1954

Sec. 1. Declaration [42 USC 2011]

*Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that—*

- a. the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and*

# Congressional Policy for the AEA

- b. the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.*



# A Simple Comparison of Risk

Description	Mortality Rate Annual Probability
Average Non-Occupational Radiation Exposure from Nuclear Fuel Cycle in the USA	<1 in 2,000,000
NESHAP Mine Radon 10 millirem/year Limit	1 in 200,000
Average Radiation Exposure in the USA (all sources)	1 in 2,740
Driving A Car 15,000 miles/yr in the USA (accidents)	1 in 2,670
Obesity-Induced Diseases in the USA	1 in 1,300
Average Cancer Fatality Rate in the USA	1 in 578
NRC's Maximum Annual Occupational Dose	1 in 400
Exposure to Air Pollutants in New York City	1 in 270
MSHA's Maximum Radon+Gamma Underground Dose	1 in 200

Radiation rates based on ICRP-60 exposure coefficients.



**Coffinite Ore**  
**Grants Mineral Belt**

# Radiation Safety Program Scope

The radiation safety program encompasses:

- licenses and permits involving radioactive material and uses of radiation
- the staff necessary to implement the program
- a written and up-to-date radiation safety program manual and supporting procedures
- monitoring and evaluation of radiation exposures to workers and the public
- monitoring and laboratory analysis of radionuclides discharged to the environment

# Radiation Safety Program Scope

The design and management of the program should integrate all radiation safety requirements pertaining to workers, public, and the environment:

- MSHA
- NRC & Agreement States
- NESHAPs
- Water Quality
- SWA/RCRA

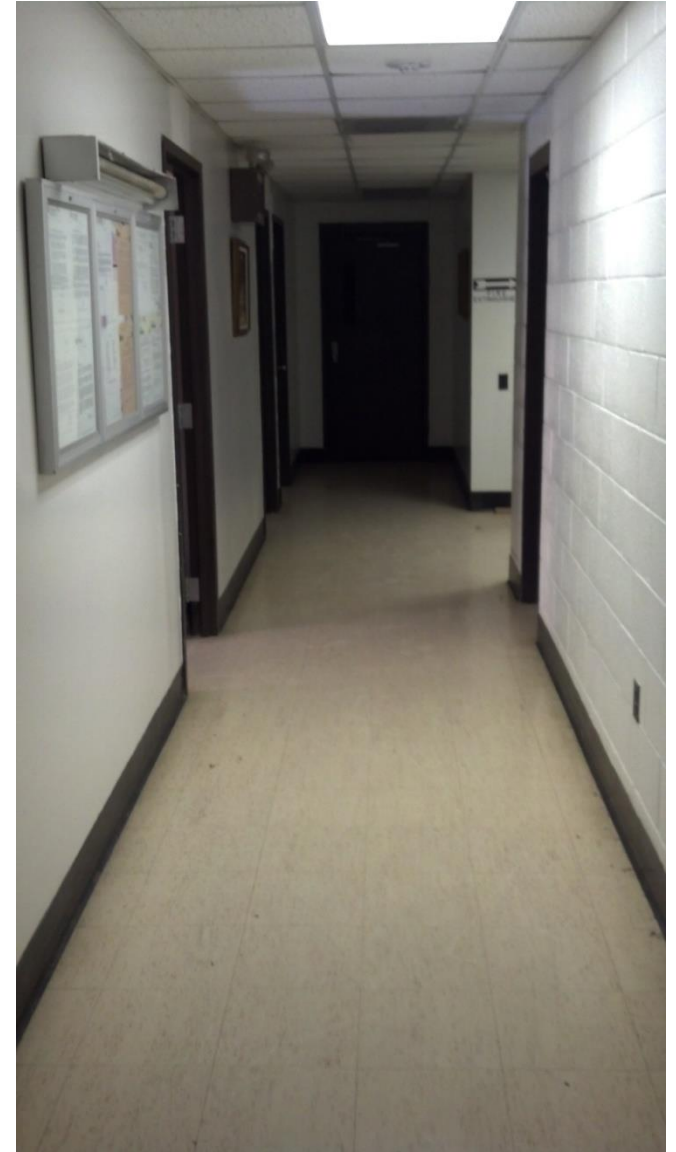


# State of the Facility and Operations

Suppose you have been charged with reactivating the radiation safety program at a facility that has been on standby.

What will you find?

Empty halls and offices, to start.



# State of the Facility and Operations



Perhaps your desk will be the one used by the RSO over 20 years ago.



# State of the Facility and Operations



Your instruments might be the best that the 1970s and 1980s had to offer, stored neatly in a cabinet since 1990.

# State of the Facility and Operations

In the lab, you may find old bench counters for analyzing swipes and air filters.



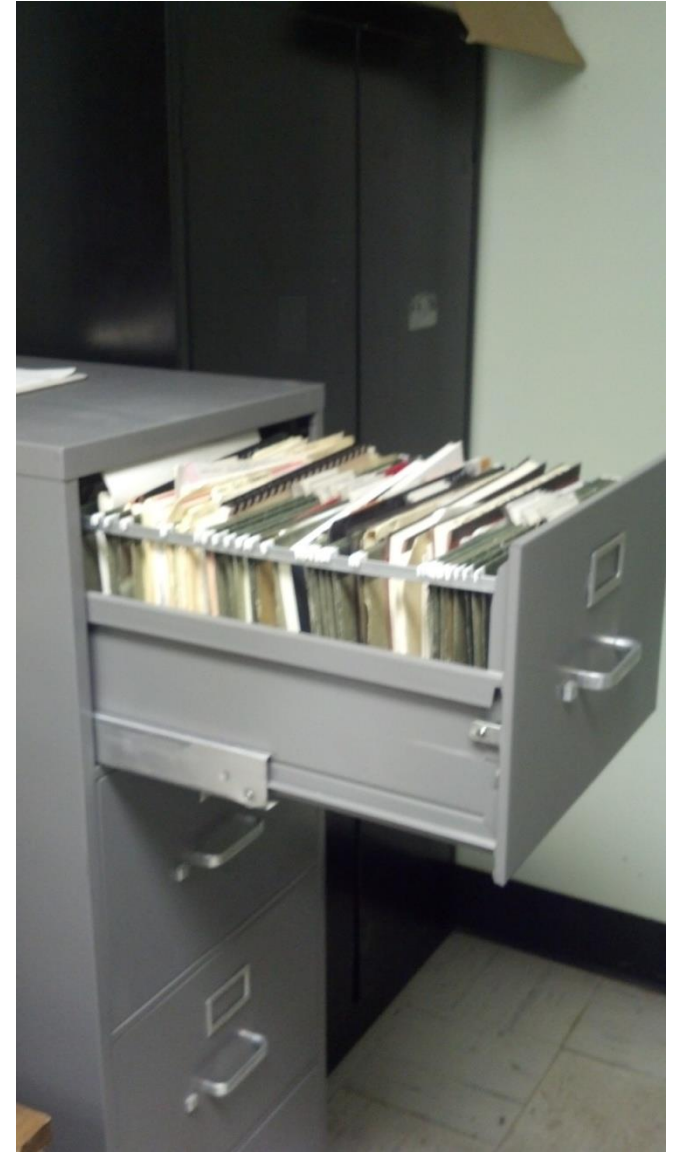
Time to get stuff repaired, calibrated and moving again!

# State of the Facility and Operations

- The filing cabinet in the lab will have paperwork dating a long ways back.

You will need to preserve these documents but also start a new system of data and documents production and retention.

Nothing was produced or stored electronically.



# State of the Facility and Operations



Speaking of old files and paperwork.  
A part of the radiation safety documents are in there.

# Restarting the Program

Prepare early to meet the regulatory requirements and the current political environment:



- Hire well-qualified help
- Develop a comprehensive radiation safety program
- Obtain new and up-to-date equipment
- Restart environmental sampling and update the baseline evaluations

This is not a good time to skimp on \$\$\$.

# Restarting the Program

Show the regulators and the opposition that you are committed to timely and efficient licensing, permitting, compliance, and operation. No bluffing here.



*Ante up! Are you in or not?*

# The Radiation Safety Staff

## Radiation Safety Officer (RSO)

*Even for mines*

- The RSO must have sufficient time obligated to fulfilling the specific duties of that position.
- It is **strongly** urged that the RSO be supervised by the general manager and not the Safety Manager or the “Environmental Programs Manager.”
- The RSO must have autonomy to adequately implement the radiation safety program and report concerns directly to the general manager.

# The Radiation Safety Staff

## Radiation Control Technicians (RCTs)

- Hire a Lead RCT with sufficient technical qualifications and experience to assist the RSO with implementing all facets of the program and to oversee the other RCTs. A good Lead RCT can watch the RSO's back and protect the company.
- Ensure that the RCTs are managed directly by the RSO, not somebody else.
- Radiation Monitor positions may be created to assist the RCTs with basic radiation surveys.



# Radiation Safety Staff Credentials

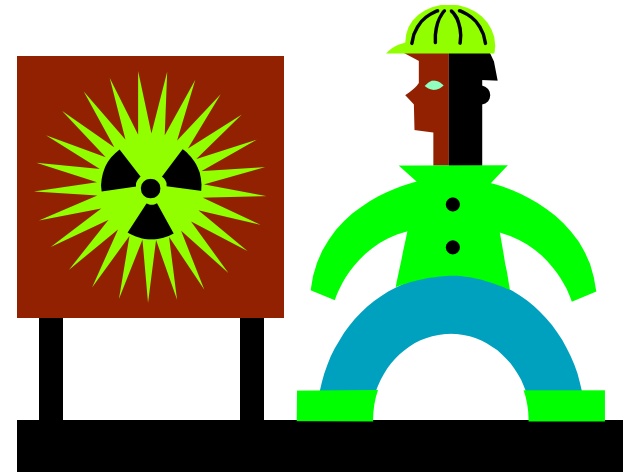
The RSO's minimum credentials must include:

- Bachelor's of Science from an accredited college or university in physical science or engineering or biological science with a minimum of 20 college credits in physical science.
- Completion of a structured educational program consisting of 200 hours of classroom and laboratory training specializing in radiation safety.
- A minimum of 5 years of professional experience in radiation safety including at least 3 years in applied radiation safety.

# Radiation Safety Staff Credentials

The preferred, minimum credentials for an RCT is:

- Three or more years operational experience at the ANSI/ANS N3.1-1993 level, or the equivalent.
- Certification by the National Registry of Radiation Protection Technologists, or the equivalent.
- Experience involving implementation of 10CFR§20 or 10CFR§835.



# Develop A Comprehensive Program

- Develop the program elements as early as possible in the licensing/permitting process.
- Address all pertinent regulatory jurisdictions.
- Prepare a radiation safety program manual.
- Prepare procedures and use radiation work permits (RWPs) when appropriate.
- Use federal and state guidances whenever possible (e.g., NUREG series, NRC Regulatory Guides).



# Develop A Comprehensive Program

- Management participation is key to successfully developing and implementing the program.
- Prepare to conduct periodic reviews of the program content and implementation.



# ALARA Is A 5-Letter Word #@?&%!

“ALARA” means as low as reasonably achievable.

Paraphrasing NRC’s definition, ALARA means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical. The complete (purely objective) definition is in 10CFR§ 20.1003.

How would **YOU** define ALARA? Despite NRC’s definition, it is not merely about reducing dose. **It is also about implementing a good safety culture.**

*ALARA may be hard to define,  
but I know it when I see it.*

# ALARA Is A 5-Letter Word

Management is required to establish and implement an ALARA policy. Make sure it is a good policy that is not prepared and implemented begrudgingly.

During the annual radiation safety program review, the RSO and management must review occupational and public doses to determine if they can be further reduced within reason.

To reduce doses, the ALARA program will use:

- administrative controls (e.g., dose constraints, procedures, training)
- physical controls (e.g., enhanced protective clothing, improved ventilation techniques, dust suppression)

# How To Deal With Regulators



# How To Deal With Regulators

- They are people, too. Imagine that.
- Communicate openly and with genuine respect.
- Foster good rapport and outcomes.
- Cooperate with them to the extent required by law and regulations.
- Provide all appropriate information when required.
- Rarely, a political or legal solution is necessary.
- There is no substitute for developing a good and compliant radiation safety program.
- Develop a strong internal QA audit program to prepare for inspections.



# Topics Review

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*Thank You*



Stanley A. "Stan" Fitch  
(505) 286-4387 office  
saf@3tks.com  
<http://www.3tks.com/>