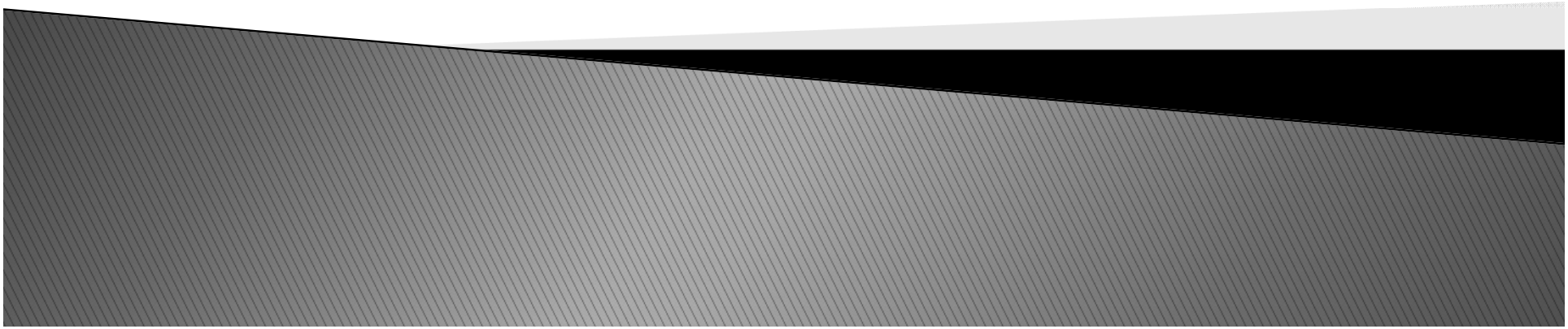
Qal-Tek

Innovating Solutions for Those Building a Better and More Secure World

Journey of an RSO

by
Michael Albanese
Qal-Tek Associates Corporate RSO



Journey of an RSO

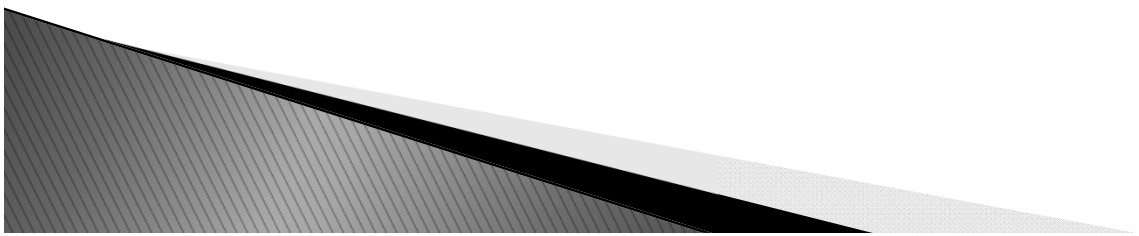
- In 1989, beginning of Jr. yr. at PA state school I was aiming to enroll in 3/2 Eng. program with Penn State

  Issue: counselor said I didn't have the grades

- A new bachelor program called "Health Physics" was starting up by an RSO from the Princeton Tokomak program

- Enrolled, became a HPS member, and before graduation took a 4 month intern position at a small PA pharmaceutical company

- Before graduating in June of 1991, my Professor referred me to a Fortune 50 pharmaceutical company, interviewed and received the offer shortly after graduating



Journey of an RSO

- Worked at one of the largest pharmaceutical research facilities in the world (peaked at 10K people) with a Type A Broad-scope license for 23 years under the tutelage of two former NRC inspectors with increasing rolls of responsibility as a Health Physics.

- One of those responsibilities was managing the Non-Ionizing program (Laser, EMF, Ultra-violet and Magnetic), which I refined into a Corporate NI Standard. During this process I became a Certified Laser Safety Officer and Corporate NI Radiation Safety Officer as well as Health Physicist.

- Upon my supervisors departure, I was tapped for the RSO position for 2 years prior to my departure to a sub-50 Radiation Services employer in Idaho for the last 4 yrs. with the honor of working with Bryce Rich, CHP.

Your Journey to RSO

Health Physics profession advantages:

- Niche field within the sciences that has multitude of sub-disciplines across many industries with a good opportunity to be recognized within the disciple and industry.
- High placement with degree and mobility as breath of experience expands
- Opportunities to move around within the disciplines (Medical, Nuclear, Pharmaceutical, Academia, DOE National Labs, Radioactive Waste, Regulator, other Industries) and volunteer (HPS, standards boards) or move into other Safety and Compliance related fields, including EHS manager.

Your Journey to RSO

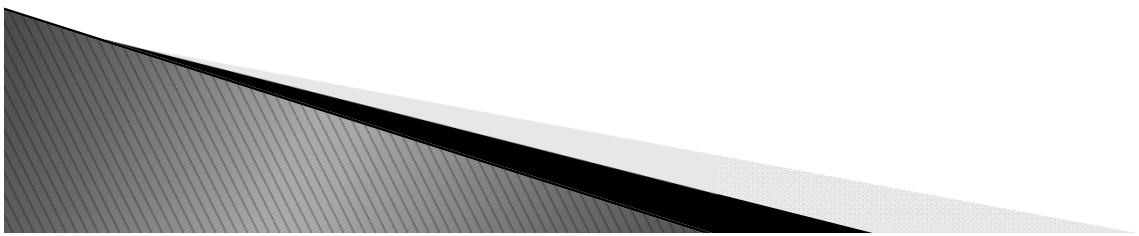
Education/Career options:

- HP degrees (BA, BS, MS, PhD)
- Certifications:
  - CHP,CLSO
  - CSP,CIH,CHMM
- DOE
  - Radiological Control Technician (RCT) 4mos./4K (DOE Core Card, RW-1, RW-2 and 40 hr. HAZWOPER)
  - NRRPT need 5 yrs. experience to qualify (self-paced/study at home/test $600+)
- It's not uncommon to get an entry level HP job if you have science degree, an aptitude to learn, and you're a good fit
- Other related professions that pay better but have more liability:
  - Nuclear Engineer, Medical Physicist, Radiologist, Radiation Oncologist, Nuclear Pharmacist

Your Journey to RSO

RSO training requirements

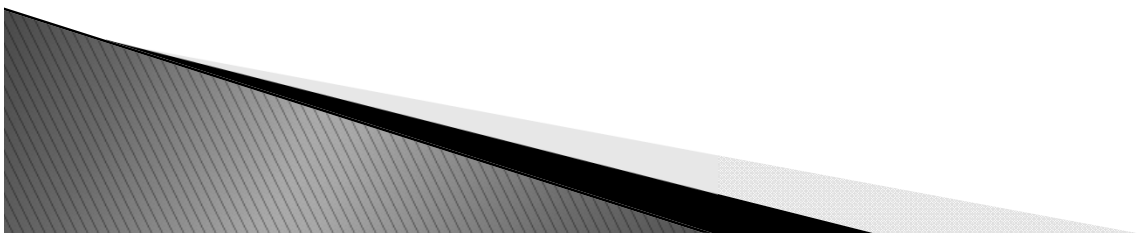
- NUREG 1556 Vol. XX – dependent on license type
  - Generally, in 10 CFR 30.33
    - RSO is qualified by training and experience to use the material for the purpose requested in such manner as to protect health and minimize danger to life or property
- Or if you are already identified on a similar license type



Your Journey to RSO

Typical RSO job requirements

- Education and experience requirements
  - BS in sciences with 3+ years experience
  - Good interpersonal skills
  - Good communications skills (written, verbal)
  - Good organizational skills
  - Basic computer skills
  - Familiar with license type and regulations
  - Management experience



Your Journey to RSO

Compensation potential:

- Company benefits – employer dependent
- Good paying job ranging from 50-135k for BS and above degreed professionals (see annual HPS salary report)
- CHP certification locks in >90k job
- Travel opportunities based on employers needs and budget
  - Annual and mid-year HPS meetings, regional HPS chapter and intra discipline meetings and multitude of off-site and computer based training opportunities

Your Journey to RSO

How to affirm you are making a good decision:

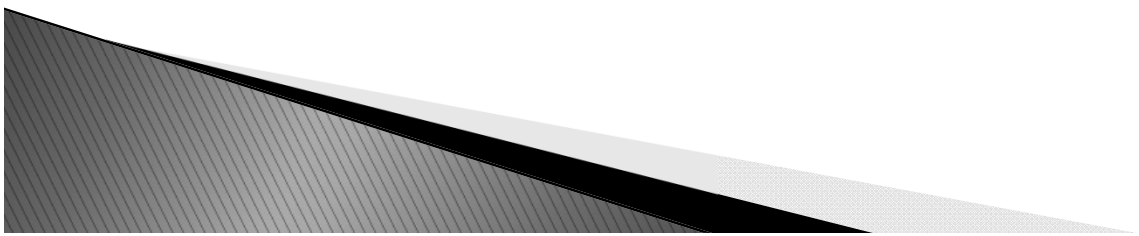
- Take Aptitude/Vocational test to define what fields align with your innate and learned skills

- Select education program that matches interests and lifestyle choices with right curriculum:
  - Mature established HP programs that address public speaking, regulatory, X-ray, licensing, non-ionizing and OSHA curriculum components – these are skills that will set you apart from other competitors

  - Online or regional opportunities for lower budget education or entry level certification opportunities (RCT or NRRPT)

RSO Responsibilities

- Covered in prior presentation by Ken Kreiger



Radiation Safety Officers

Who and Where They Are.

Kenneth Krieger, MS, CHP, LSO, NRRPT

Radiation Technology Inc.

For the Southwestern compact seminar

Oct 23, 2018

What are Radiation Safety Officers (RSOs)?

Radiation safety officers are individuals that are in charge of the radiation safety program of the facility in which they work

RSOs make sure that the facility is complying with all laws and regulations regarding radioactive material.

Ensure radioactive material is handled in the safest way possible.

They stop any unsafe activities with licensed material.

More later!!!

What are the requirement of RSOs?

- NRC
  - Passes an approved Radiation safety office course (40 hrs)
  - BS or higher
  - 5 or more years experience
  - variations
- Agreements States
  - Passes an approved Radiation safety office course (40 hrs)
  - BS or higher
  - 2 years relevant experience in field
- Specialties

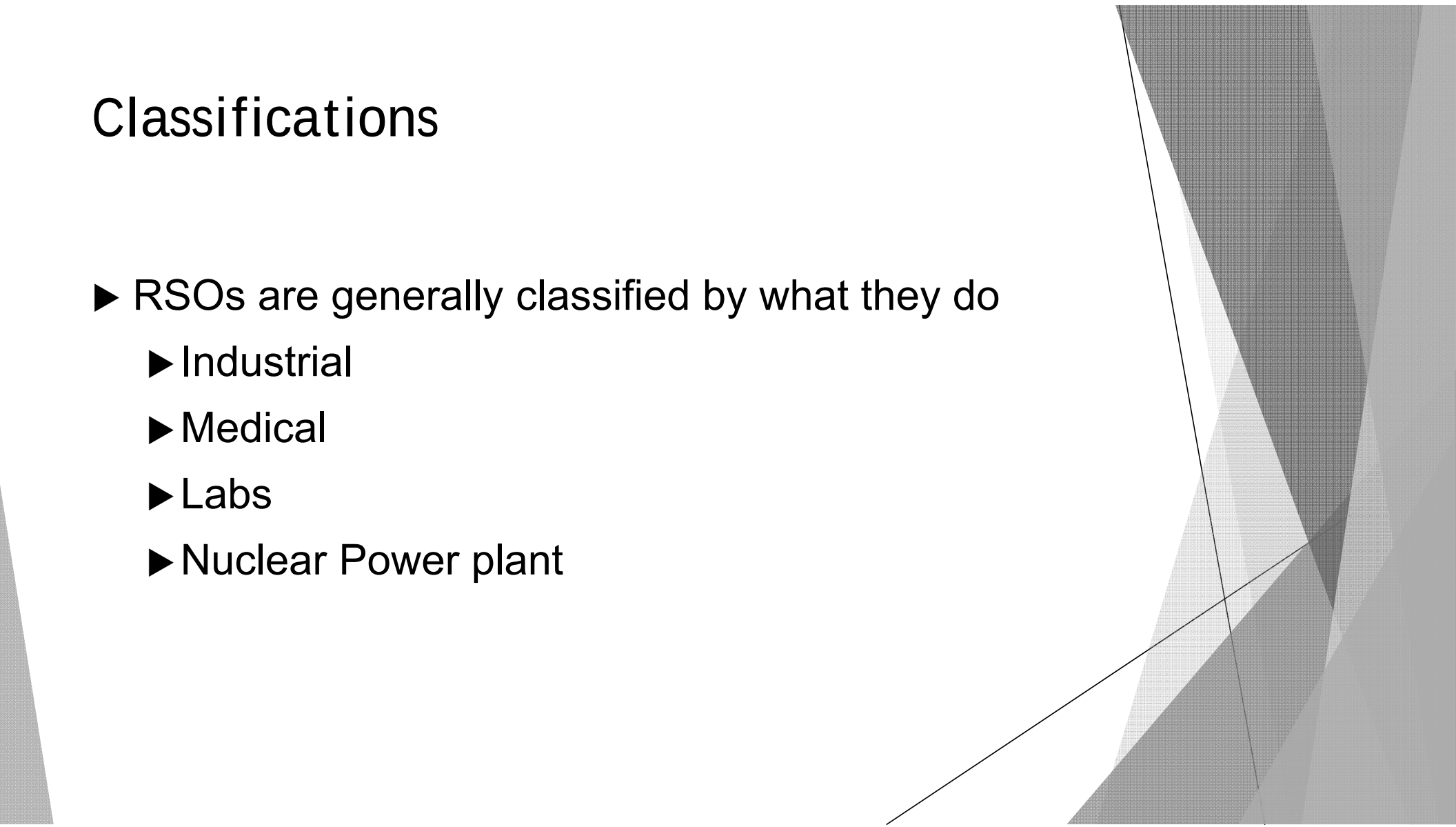
Where are RSOs?

- Chemical Companies
- Petrochemical Companies
- Paper Mills
- Steel Mills
- Precious Metals Mining
- Iron Mining
- Oil and Gas Industry

- Hospitals
- Cancer treatment facilities
- Nuclear Power plants
- Coal Fired Power Plants
- National Labs
- NDT
- Food Industry

Classifications

- RSOs are generally classified by what they do
  - Industrial
  - Medical
  - Labs
  - Nuclear Power plant

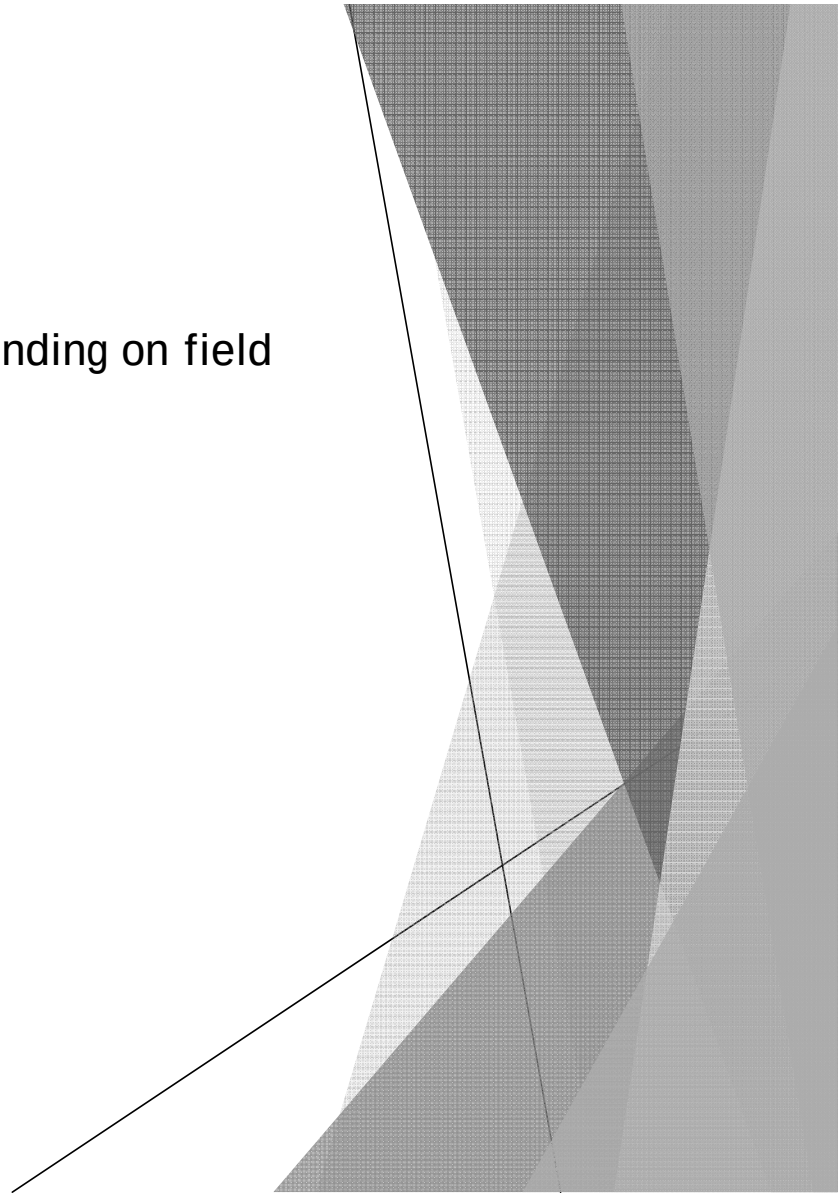


Not all the same

- RSO in different areas can not be interchanged
- Radiation protection concepts are the same
- Medical RSOs have different set of concerns that Industrial RSOs
- Accelerator RSOs have different issues than labs
- Internal vs external
- Sealed source vs loose rad material
- Must be familiar with concerns of the facility

Many uses

- The reason why one uses rad material are varied depending on field
  - Industrial – process control
    - level, density measurement
  - Medical – diagnoses and treatment
    - Stress test, thyroid, cancer
  - labs- research
    - drugs, tracers
  - accelerators-research medical
    - high energy effects
  - sterilizers –medical or food sterilization
    - large sources or generators



Who are Industrial RSOs?

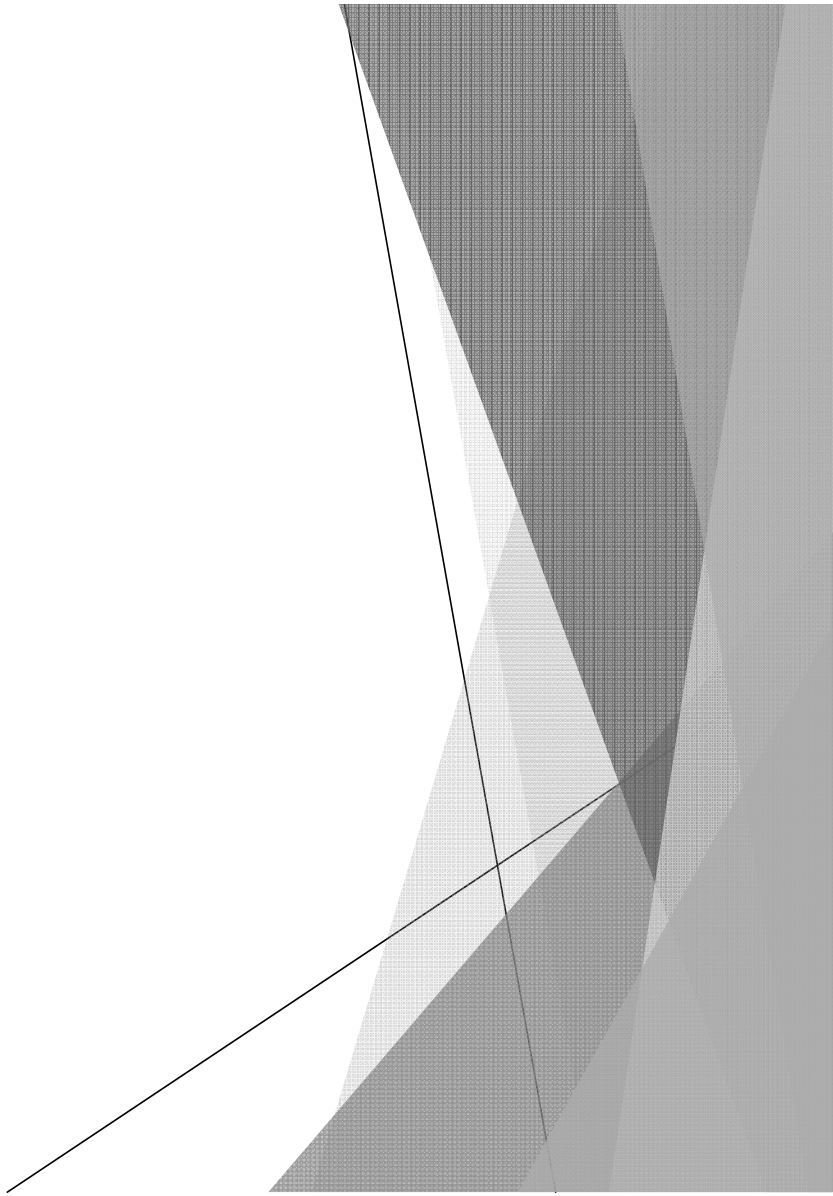
- Not health physicists, engineers, etc
- Mostly safety background
- Put into position due to
  - Old RSO left
  - Its related to safety
- Much practical experience
- Not as much formal radiation schooling

What do IRSOs Do?

- Most of the time they are performing their “real job”.
- Most IRSOs are safety managers, safety officers, Industrial Hygienists, etc.
- Even on a plant with 100 gauges, an IRSO will spend only about 10% - 15% of the time performing or directing radiation related tasks.
- Not really interested in the science of radiation but how can I pass an inspection from a regulator

What do RSOs Do?

- RSO on the License
- Keep Track of Paperwork
  - Training
  - Leak testing
  - Inventory
  - Monitoring
  - Decommissioning
  - Memos to File
  - Disposal
- Interact with Regulators



Paperwork

- Training
  - Who was trained on what
  - Who and when were they taught
  - All has to be documented
- Leak Testing
  - Every six months or manufacturer recommendation
  - Special form -3 years; Normal form- 6 months
- Decommissioning
  - Where on site have you used and stored material
  - Will help when done

Paperwork

- Monitoring
  - Review dosimetry
    - Sign
    - Investigate
  - If you don't use dosimetyry need to provide proof you are not getting close to limits
    - Historical data
    - Calculations
- Memos to file
  - ALARA statement
  - List of Authorized and occupational workers
  - Management support statement
  - Review of Program (annual)

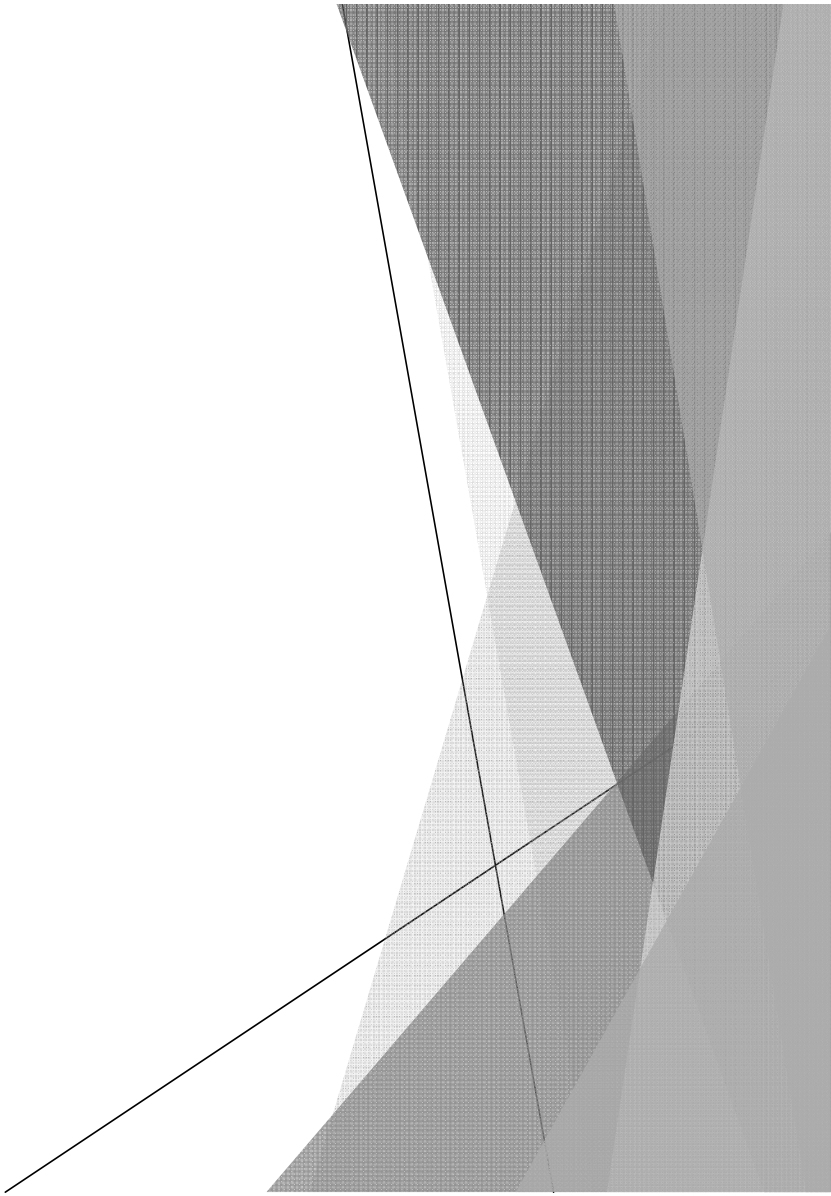
Disposal

- When a facility is done with the radioactive materials there are several places it can go
  - Hospitals can let theirs decay away and turns into normal trash
  - Find someone who can use the material and transfer it
  - Find companies that can find other people who can use it , recycle?
    - Theoretically a source can be used for several half-lives, depends on what activity is needed but problems with source integrity etc
  - More that likely it will be disposed of
- Need to keep transfer or disposal paperwork

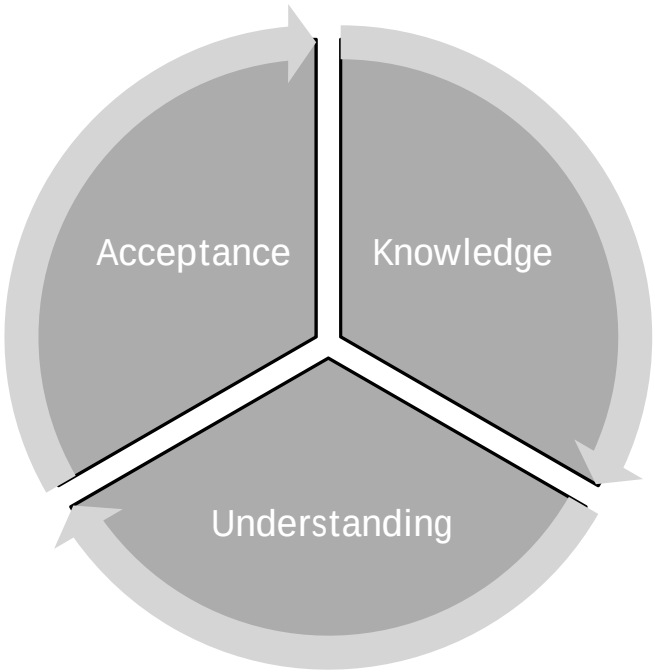
What happens to waste

- Types of waste
- Disposal Compacts
- Disposal facilities
- ETC

- To be continued in other presentations



Questions



RCRA, LLW and the Future of VLLW

John Fassell

California Department of Public Health

Outline of Presentation

- What is RCRA?
- Cradle to Grave Approach of RCRA Management
- Current Receiving Facilities in California
- Uhhhhhhh……

What is RCRA?

- RCRA refers to the Resource Conservation and Recovery Act
- Covers Nonhazardous Waste, Hazardous Waste and Underground Storage Tanks (leaking ones fall under the LUST program)
- The concern here is the Hazardous Waste
- The EPA delegates the rule making for Hazardous Waste to the states much like the NRC uses the Agreement State program rulemaking
- RCRA helps reduce the chance of future Superfund sites and provides some guidance in their cleanup
- Under RCRA, Hazardous Waste is tracked cradle to grave

Cradle to Grave Approach of RCRA Management

- Just like radioactive sources are evaluated during inspections the RCRA Hazardous Waste is tracked from it's initial creation to it's final disposal
- A radioactive source is created by a specific manufacturing process if it is a sealed source which is then given a serial number. Some small sources are part of a lot which is given a lot number and assigned the appropriate transportation paperwork. However radioactive waste could just be discovered and then identified as waste.

Cradle

- Hazardous Waste first needs to be declared waste and then it needs to be identified as Hazardous Waste.
- Generally Hazardous Waste Generators need to evaluate the form, specific listings and exceptions from EPA or State regulations to determine if a given waste is considered Hazardous Waste.
- The size of the Hazardous Waste Generator is determined by the volume of waste and its composition. The size then dictates how long and how much of the wastes can be stored on site before they are transferred to a transporter.

Cradle to Transport

- Radioactive sources are used, kept track of in inventory and at some point declared as waste. Each of these steps can be tracked, whether in use logs, treatment plans, inventories or waste and disposal logs.
- Radioactive wastes can be decayed out, transferred, disposed in sanitary sewers (in some cases and quantities) or put into storage.
- Hazardous wastes generally need to be transported at some point due to holding time restrictions
- Both need to be manifested for transport which is the next step of documentation.

Transport to the Grave

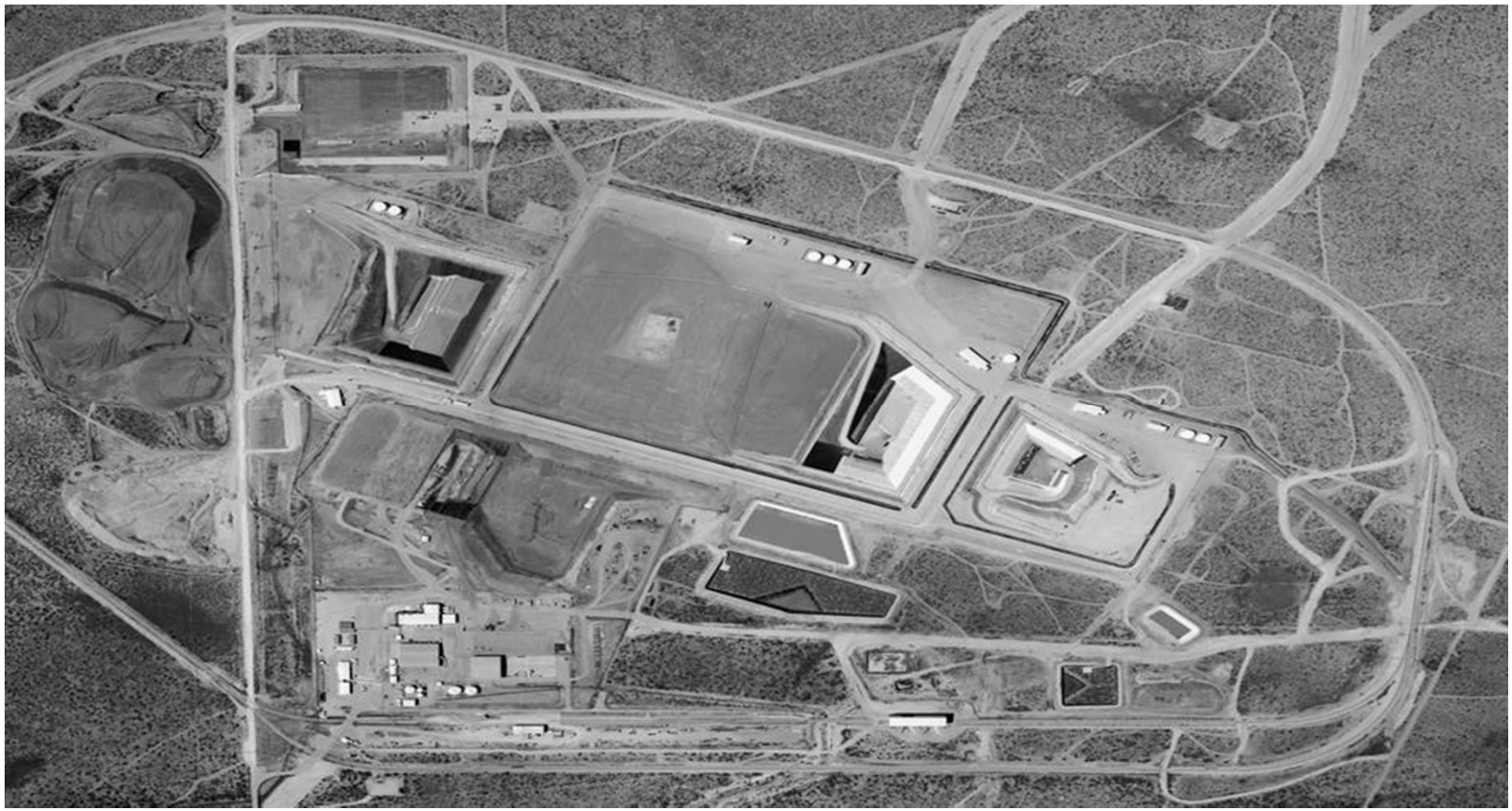
- Radioactive waste being transported is usually bound for storage or disposal.
- Hazardous waste can be recycled, treated or disposed.
- Radioactive waste needs to be accepted at the storage or disposal facility according to the site's waste acceptance criteria. It is usually compared to a previously accepted waste profile.
- Radioactive waste usually involves payment of fees to Compacts

Grave

- Radioactive wastes usually go to Andrews, Texas or the Clive, Utah site
- In some very limited cases disposal at one of the Class 3 landfills in California might work
- Hazardous wastes can be recycled as when tires are used as fuel in a coal fired power plant
- Hazardous wastes could be treated like when dichromate in water is exposed to reducing gases to stabilize it as chromium oxide
- Otherwise hazardous waste needs to go to an appropriate landfill

Clive, Utah facility by Energy Solutions

CWF Andrews Texas operated by WCS

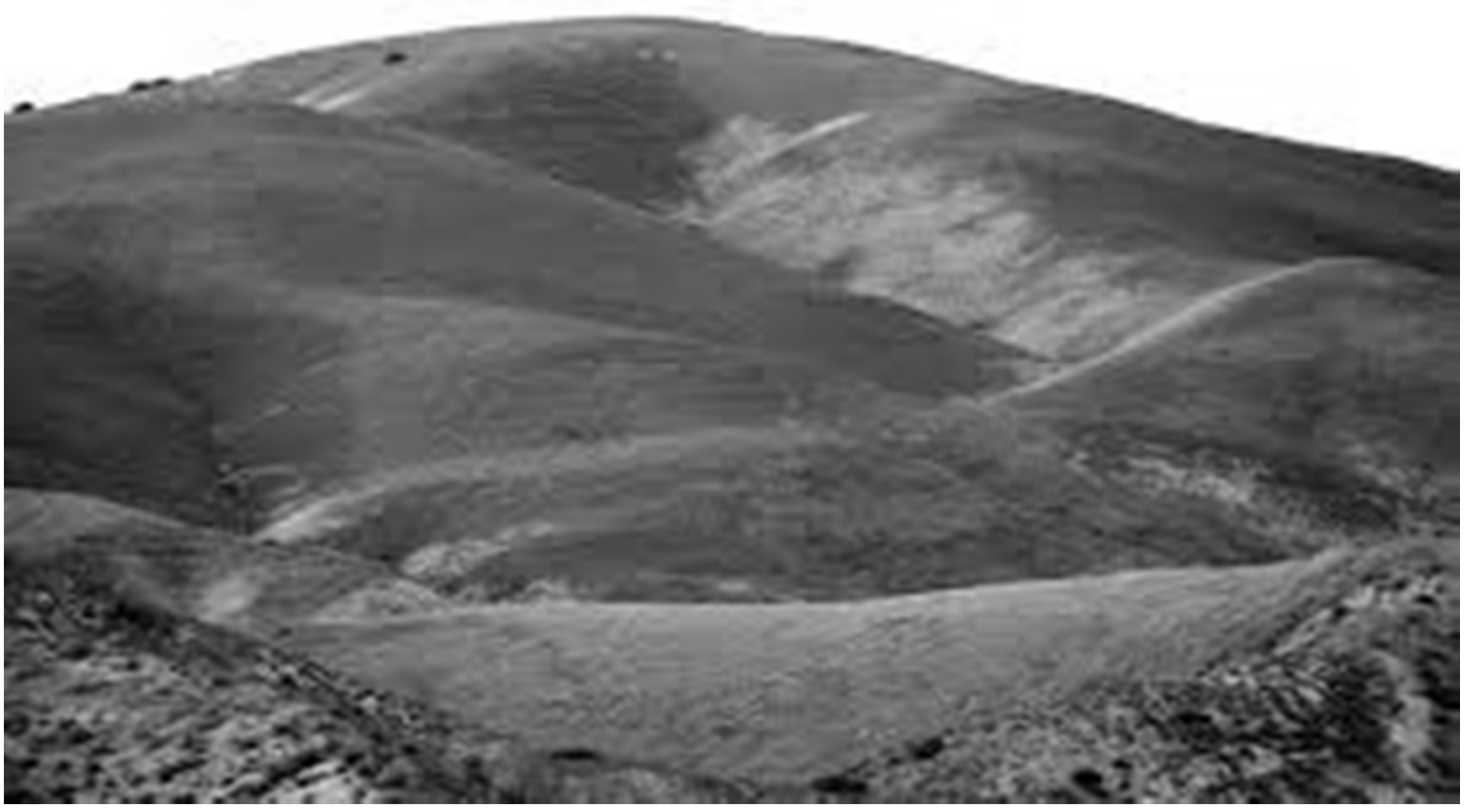


Current Receiving Facilities in California

- We have three Class 3 landfill sites in California. They are located in Buttonwillow, Kettleman, and Westmorland
- All of these garden spots were carefully chosen as landfill sites wherein the geometric artistry of landfills would improve the local scenery
- Included are some images before and after rain

Normal appearance of landfill environs

Area near Kettleman Hills/ Buttonwillow



Area near Kettleman Hills/ Buttonwillow

Area near Kettleman Hills/ Buttonwillow

Kettleman Hills Facility by Waste Management Solutions

- Located on State Highway 41 about 3.5 miles southwest of Kettleman City
- Can accept NORM waste up to 1800 pCi/gram of U-238, U-235 and Th-232 and their daughter products (most commonly Ra-226)
- Cannot accept material that would normally go on a federal or state radioactive materials license.
- Currently undergoing permit renewal


Governor Edmund G Brown California Aqueduct
Kettleman City
Kettleman Hills Facility

Kettleman Hills Landfill Closeup

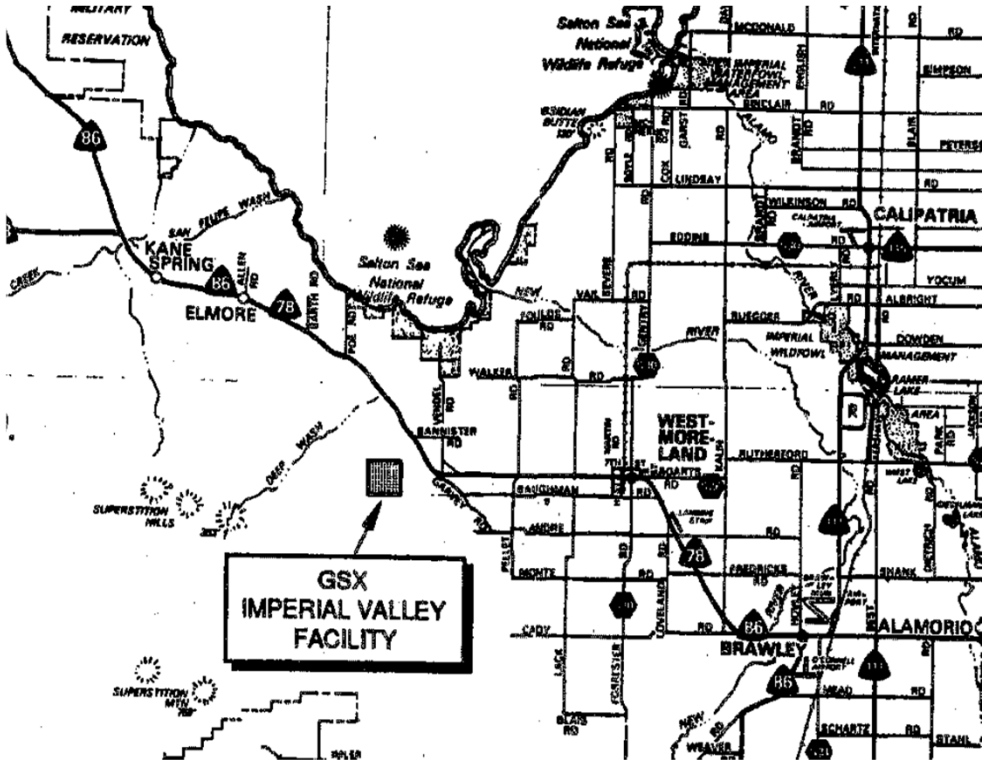
Buttonwillow Facility by Clean Harbors

- Located about five miles west of Buttonwillow
- Can accept NORM and TENORM waste up to 1800 pCi/gram of U-238, U-235 and Th-232 and their daughter products (most commonly Ra-226)
- Cannot accept material that would normally go on a federal or state radioactive materials license.
- Originally intended for oil and gas TENORM wastes
- Under licensing review

Westmoreland facility by Clean Harbors

- Just west of Westmoreland
- Can accept NORM and TENORM waste up to 1800 pCi/gram of U-238, U-235 and Th-232 and their daughter products (most commonly Ra-226)
- Cannot accept material that would normally go on a federal or state radioactive materials license.
- Not currently accepting anything
- License under review for reopening (CEQA review differences)
- Originally intended for geothermal TENORM well waste

Westmoreland facility general area



Westmoreland local image

ENERGYSOLUTIONS

SW Compact Workshop
Clive 2018 Disposal Update

Dan Shrum

October 23, 2018

Safety

- Industrial Safety
  - Awarded VPP Star in 2017
  - Above 12 days between incidents
  - 1,977,740 work hours since last Lost Workday case (November 2010)
  - Prior to an incident December 2017, 947,650 work hours since last OSHA Recordable Injury
  - 2010 through 2017 Annual NSC Awards for Safety
- Radiation Safety
  - ALARA - Average radiation worker individual TEDE 41 mrem/year
  - Highest general public fence-line CEDE 0.26 mrem/year
  - Highest general public effluent exposure dose 0.29 mrem/year

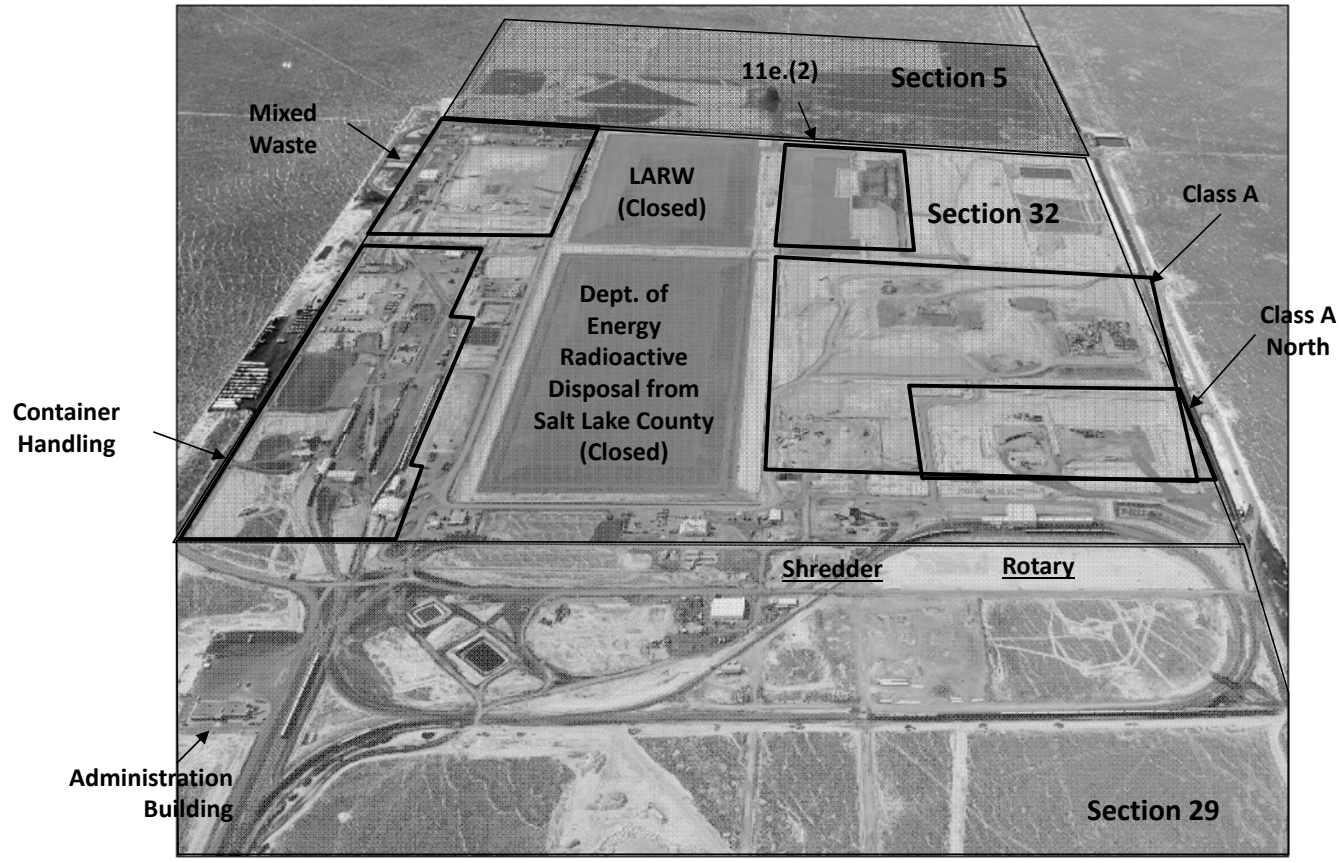
Clive Disposal Facility

Proven Experience

- Over 30 years of proven experience treating and disposing of radioactive waste
- Unique bulk and containerized waste facilities
  - Radioactive Material Licenses (LLRW & 11e(2))
  - RCRA Permit (treatment & disposal of MW)
  - TSCA Permit (PCB waste streams)
  - SNM Exemption (concentration-based limits)
- Over 11 miles of on-site rail for efficient and cost-effective waste handling
- Long-term federal and commercial contracts

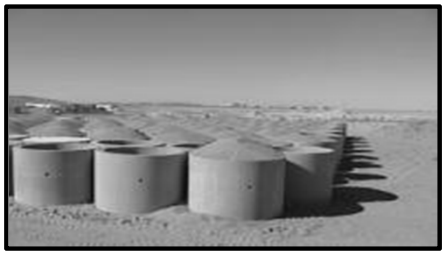
Clive Disposal Facility

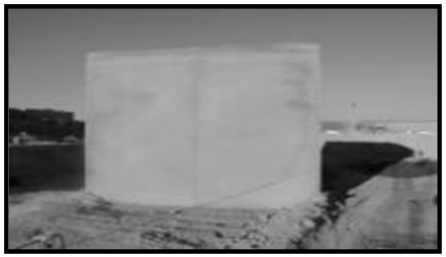
Site Layout



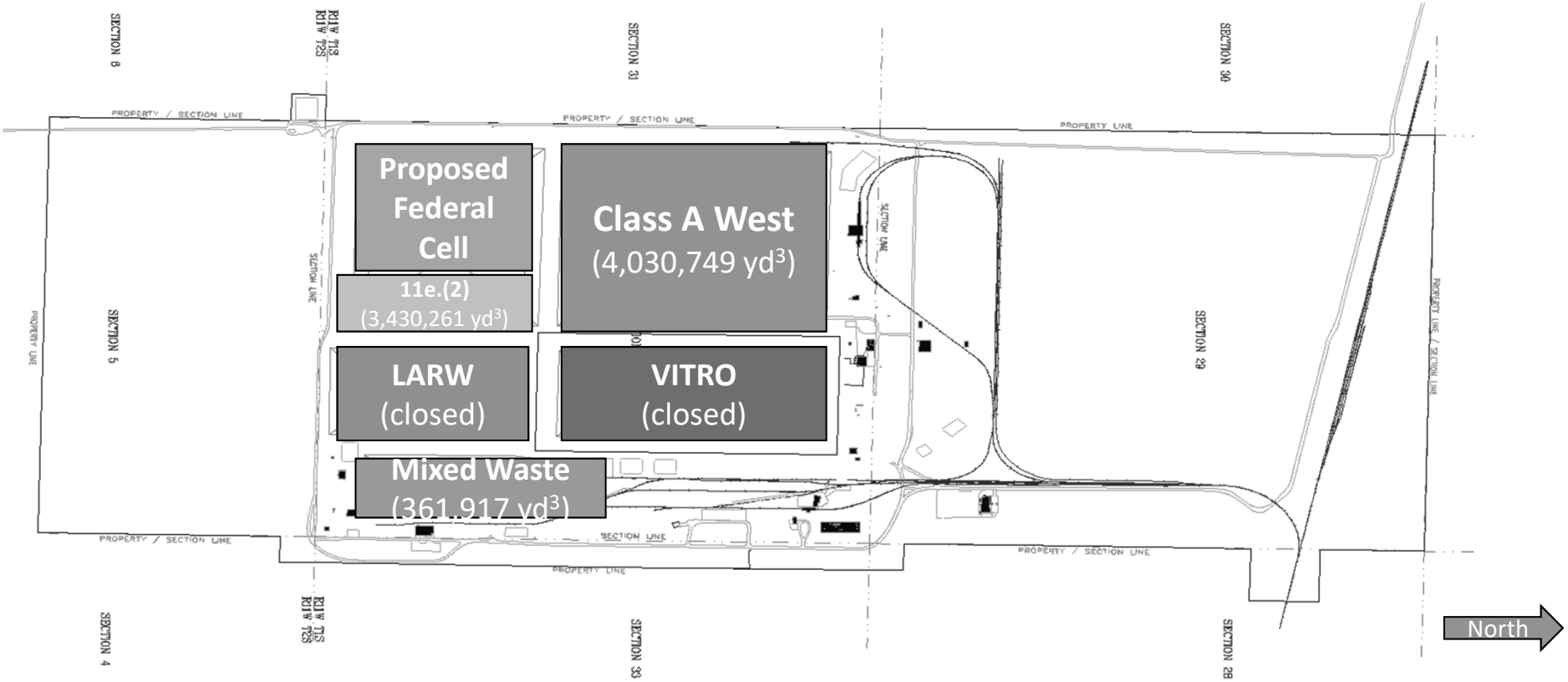
Licenses and Permit Status

- RML 2300249 Low-Level
  - Under "timely renewal"
  - Renewal application Oct 2012
  - Projected to be renewed December 2018
- RML 2300478 11e.(2)
  - Active
  - Renewed November 30, 2017
- State-issued Part B Permit
  - Under "timely renewal"
  - Renewal application Oct 2012
  - Projected to be renewed Dec 2018
- GW QDP
  - Active
  - Renewed 2014

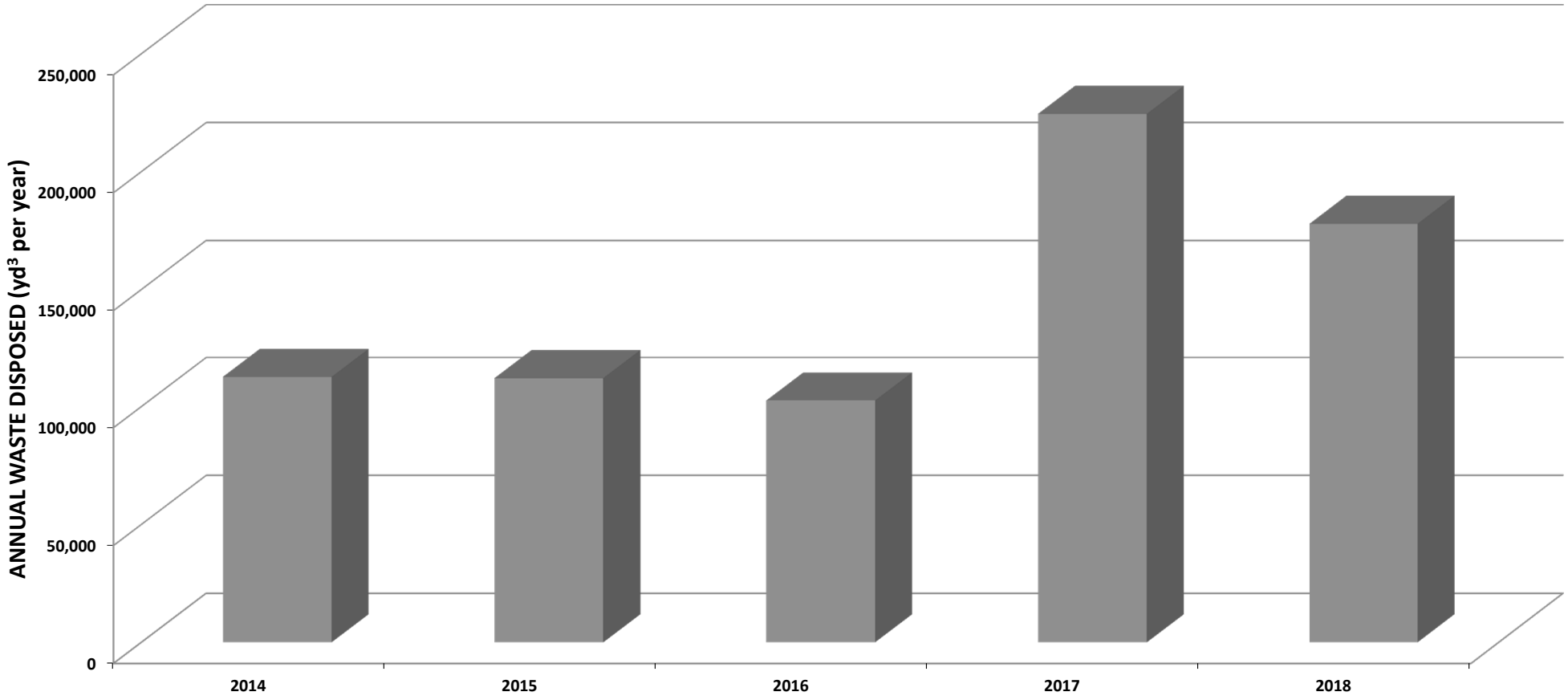




Clive's Disposal Available Capacity



Disposal Volume History



VLLRW

- Definite need for VLLW category
- Support Rulemaking - not on-going exemption process – Public Trust and efficiency
- Either 61.55-type limits, OR
- Select a specific dose standard such as 25 mrem/year
- Analysis should be based on packages as disposed – not as assumptions of total cell source term
- Disposal sites must meet siting and financial criteria

Dated: February 9, 2018.

Suzanne H. Plimpton,

Reports Clearance Officer, National Science Foundation.

[FR Doc. 2018–03002 Filed 2–13–18; 8:45 am]

BILLING CODE 7555–01–P

NUCLEAR REGULATORY COMMISSION

[NRC–2018–0026]

Very Low-Level Radioactive Waste Scoping Study

AGENCY: Nuclear Regulatory Commission.

ACTION: Scoping study; public meeting and request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is conducting a very low-level radioactive waste (VLLW) scoping study to identify possible options to improve and strengthen the NRC's regulatory framework for the disposal of the anticipated large volumes of VLLW associated with the decommissioning of nuclear power plants and material sites, as well as waste that might be generated by alternative waste streams that may be created by operating reprocessing facilities or a radiological event. The NRC is seeking stakeholder input and perspectives on this action. Respondents are asked to consider specific questions posed by the NRC staff and other Federal agencies in this notice when preparing their responses.

DATES: Submit comments by May 15, 2018. Comments received after this date will be considered if it is practical to do so, but the NRC is able to ensure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

- *Federal Rulemaking website:* Go to *http://www.regulations.gov* and search for Docket ID NRC–2018–0026. Address questions about NRC dockets to Jennifer Borges; telephone: 301–287–9127; email: *Jennifer.Borges@nrc.gov.* For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.
- *Mail comments to:* May Ma, Office of Administration, Mail Stop: OWFN–2–A13, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: Maurice Heath, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; telephone: 301–415–3137; email: *Maurice.Heath@nrc.gov.*

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID NRC–2018–0026 when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- *Federal Rulemaking website:* Go to *http://www.regulations.gov* and search for Docket ID NRC–2018–0026.
- *NRC's Agencywide Documents Access and Management System (ADAMS):* You may obtain publicly-available documents online in the ADAMS Public Documents collection at *http://www.nrc.gov/reading-rm/adams.html.* To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1–800–397–4209, 301–415–4737, or by email to *pdr.resource@nrc.gov.* The ADAMS Accession Number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in the **SUPPLEMENTARY INFORMATION** section.
- *NRC's PDR:* You may examine and purchase copies of public documents at the NRC's PDR, Room O1–F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

B. Submitting Comments

Please reference Docket ID NRC–2018–0026 in your comment submission. If your comment contains proprietary or sensitive information, please contact the individual listed in the **FOR INFORMATION CONTACT** section of this document to determine the most appropriate method for submitting your comment.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. All comment submissions are posted at *http://www.regulations.gov* and entered into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment submissions into ADAMS.

II. Background

In 2007, following developments in the national program for Low-Level Radioactive Waste (LLRW) disposal, as well as changes in the regulatory environment, the NRC conducted a strategic assessment of its regulatory program for LLRW. The results of this assessment were published in late 2007 in SECY–07–0180, "Strategic Assessment of Low-Level Radioactive Waste Regulatory Program" (ADAMS Accession No. ML071350296). The strategic assessment identified the need to coordinate with other agencies on consistency in regulating LAW disposal and to develop guidance that summarizes disposition options for low-end materials and waste.

In 2016, the NRC staff conducted a programmatic assessment of the LLRW program to identify and prioritize tasks that the NRC could undertake to ensure a stable, reliable, and adaptable regulatory framework for effective LLRW management. The results of this assessment were published in October 2016, in SECY–16–0118, "Programmatic Assessment of Low-Level Radioactive Waste Regulatory Program" (ADAMS Accession No. ML15243A192). The programmatic assessment identified the need to perform a LAW scoping study as a medium priority.

In International Atomic Energy Agency (IAEA) Safety Guide No. GSG–1, "Classification of Radioactive Waste" (*http://www-pub.iaea.org/MTCD/publications/PDF/Pub1419_web.pdf*), the IAEA defines VLLW as waste that does not meet the criteria of exempt waste, but does not need a high level of containment and isolation, and, therefore, is suitable for disposal in a near surface landfill type facility with limited regulatory control. The NRC currently does not have a formal regulatory definition for VLLW, nor has it adopted the IAEA definition. However, the NRC uses the term VLLW consistent with the international regulatory structure. In general, the NRC

Zion Decommissioning

Conference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WASTE CONTROL SPECIALISTS

WCS Update for SW Compact

October 2018

WASTE CONTROL SPECIALISTS

Update Topics

1. Disposal Pricing and Surcharges
2. Disposal Capacity
3. Legislative Agenda
4. WCS Initiatives

WASTE CONTROL SPECIALISTS

Source of Rates and Fees for CWF Disposal

- Disposal rates (prices) for the Compact Waste Disposal Facility (CWF) are in 30 Texas Administrative Code §336.1310
  - Maximum rates for in-compact generators
  - Minimum rates for out-of-compact generators
  - Rate reductions have been limited by the rule

- Fees (surcharges) on disposal are established in Texas Health and Safety Code, Section 401
  - Applied in addition to the disposal rates (prices)
  - Funds to Texas General Revenue, Environmental Perpetual Care, Andrews County, and Compact Commission

Disposal Price Reduction

1. Base Disposal Charge:

1A. Waste Volume Charge: Charge per cubic foot ($/ft3)

Class A LLW - $100

~~Class A LLW – Routine $100~~

~~Class A LLW - Shielded: $180~~

Class B and C LLW: $1,000

Sources - Class A: $500

~~Biological Waste (Untreated): $350~~

1B. Radioactivity Charge

Curie Inventory Charge ($/mCi): $0.40 ~~$0.55~~

Maximum Curie Charge (per shipment) (excluding C-14): $220,000/shipment

~~Carbon-14 Inventory Charge ($/mCi): $1.00~~

~~Special Nuclear Material Charge ($/gram): $100~~

2. Surcharges to the Base Disposal Charge:

2A. Weight Surcharge Weight (lbs) of Container: Surcharges ($/container)

~~10,000 to 50,000 lbs: $10,000~~

Greater than 50,000 lbs: $20,000

2B. Dose Rate Surcharge - Surface Dose Rate (R/hour) of Container: Surcharge per cubic foot ($/ft3)

~~1-5 R/hour: $100~~

~~Greater than 5 to 50 R/hour: $200~~

~~Greater than 50 to 100 R/hour: $300~~

Greater than 500 ~~100~~ R/hour: $400

2C. Irradiated Hardware Surcharge

Surcharge for special handling per shipment: $75,000/shipment

~~*2D. Cask (Shielding Waste) Surcharge*~~

~~Cask handling surcharge per cask: $2,500/cask~~

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Disposal Surcharge Reduction

	In Compact Generators	In Compact, Reduced to 2019	Out of Compact Generators	Out of Compact, Reduced to 2019
Andrews County	5%	5%	5%	5%
State General Revenue	5%		5%	
Environmental Perpetual Care Fund			20%	10%
Compact Commission	1.25%	1.25%	1.25%	1.25%
TOTAL	11.25%	6.25%	31.25%	16.25%

- 2017 TX legislation temporarily reduced fees on disposal at WCS
- Reductions in place from June 15, 2017 to September 1, 2019

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WCS Licensed Capacity

CWF Capacity – 9,000,000 ft^3

- Currently used = 125,000 ft^3 (1% of capacity)

FWF Capacity – 26,000,000 ft^3

- Currently used = 300,000 ft^3 (1% of capacity)

RCRA (LAW) Capacity – 62,000,000 ft^3

- Currently used = 20,000,000 ft^3 (30% of capacity)

Site is 14,000 acres with space for additional future expansion

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WCS Current Facilities

Byproduct Facility

Hazardous Waste Landfill

Treatment Facilities

Byproduct Facility

Federal Facility

Federal Facility

Compact Facility

Compact Facility

RCRA (LAW) Facility

TCEQ Estimate of In-Compact Waste Generation

Assumptions:
(1) Total of all in-compact waste through 2044
(2) No new NPP construction

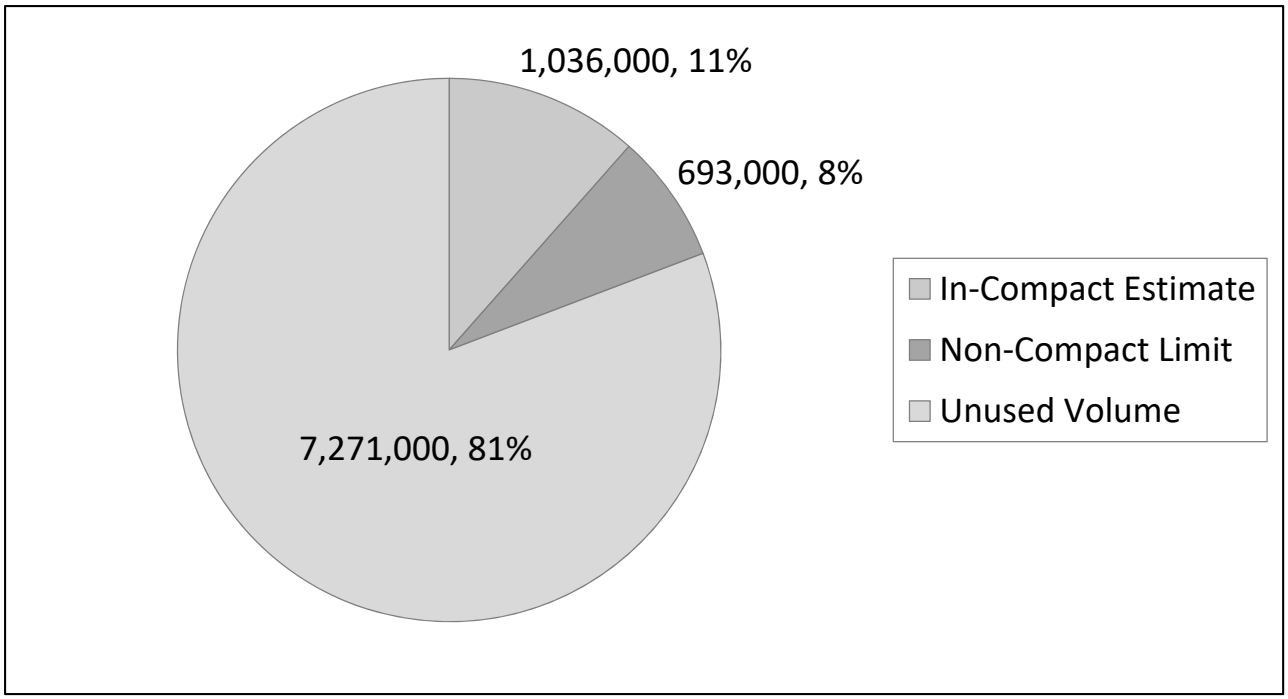
"Texas Compact utility operations Class A LLRW may have other disposal pathways besides the CWF. Texas generators have consistently sought export authorization for disposal pathways outside of the Texas Compact."

Source: TCEQ Report, *Capacity Report for Low-Level Radioactive Waste,* page 10-11, 2016.

CWF – Lifecycle Volume

WASTE CONTROL SPECIALISTS

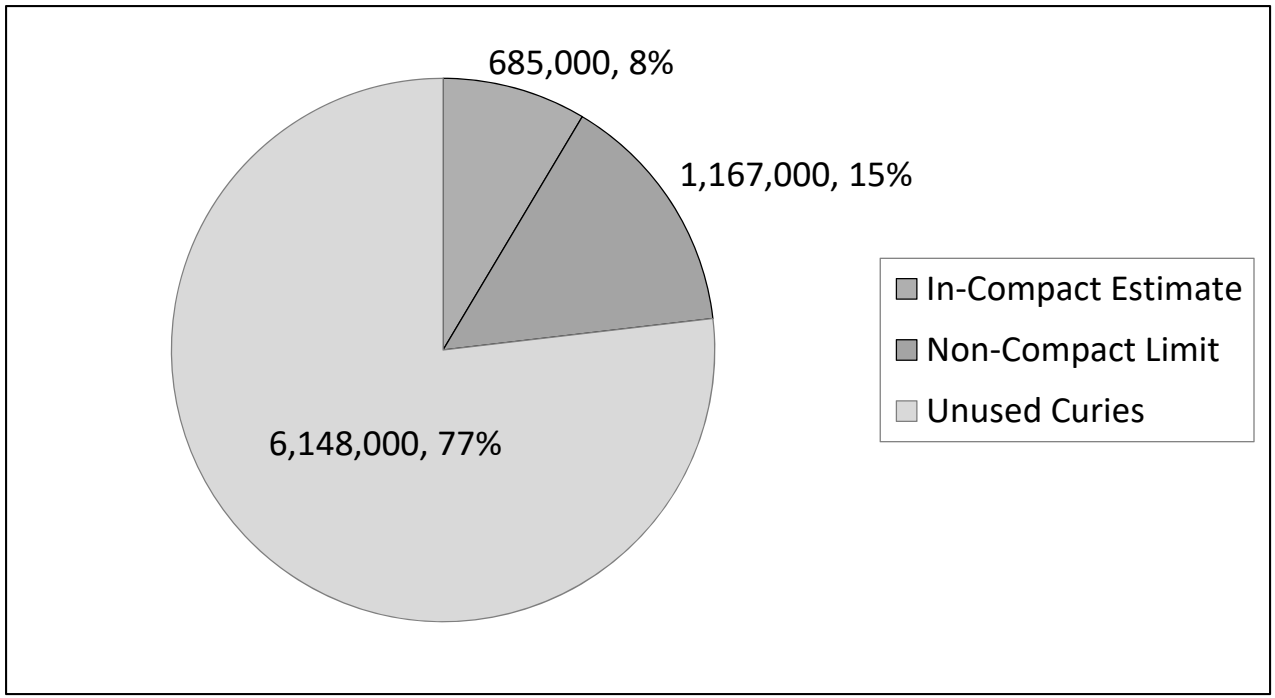
Volume



Total volume of 9,000,000 ft^3 per license
In-compact volume per 2016 TCEQ Capacity Report
Non-Compact volume limit per TX H&S Code 401.207 (e) & (f)

CWF – Lifecycle Curies

Curies



Total of 8,000,000 curies per license
In-compact curies per 2016 TCEQ Capacity Report
Non-Compact curie limit per TX H&S Code 401.207 (e) & (f)

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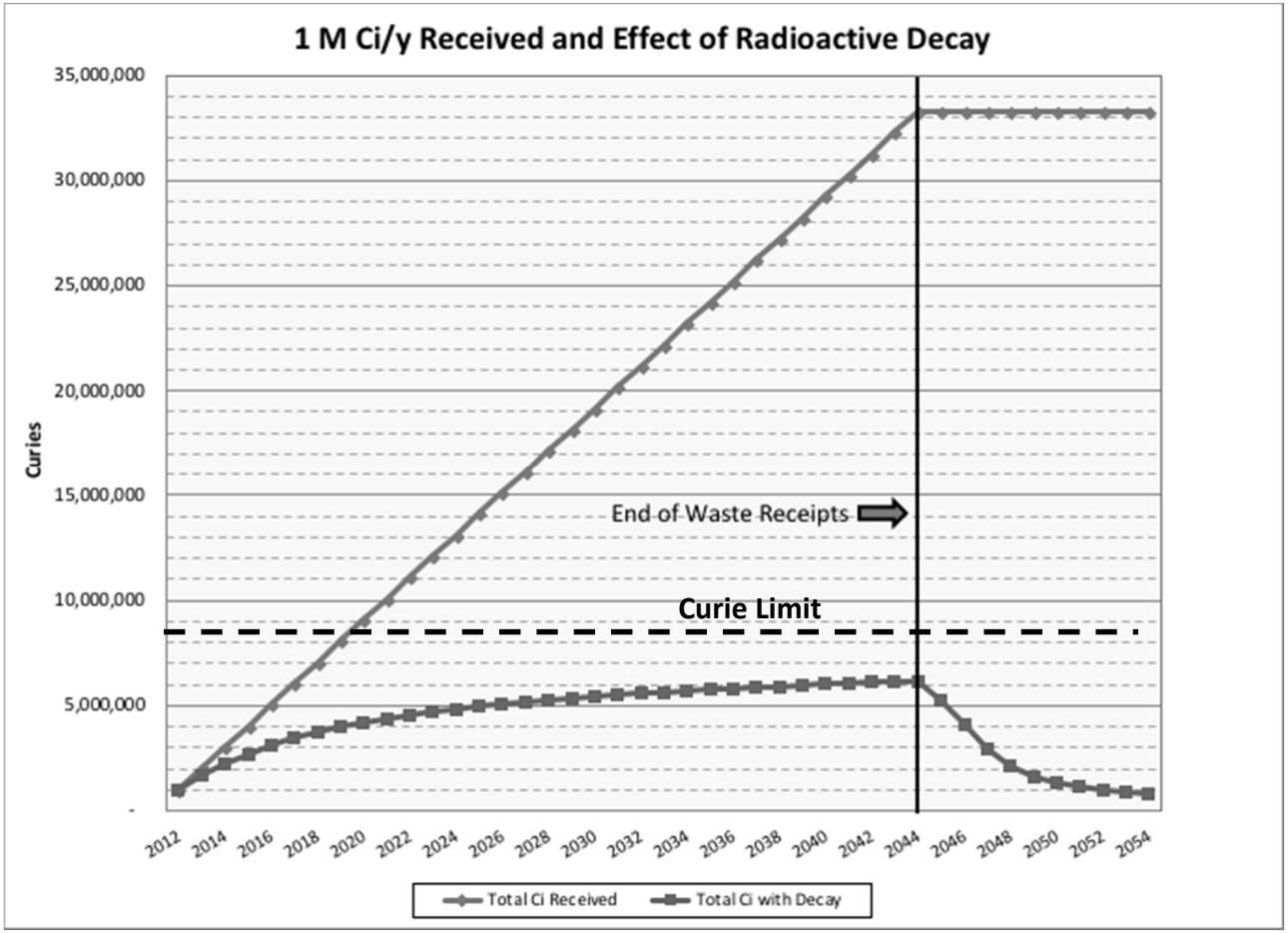
CWF Curie Limit
(with Decay Correction)



Isotope	Half life (yr)	% of activity
CO-60	5.3	25%
CO-58	0.2	16%
FE-55	2.7	14%
H-3	12.3	10%
NI-63	100.1	9%
EU-152	13.6	9%
MN-54	0.9	4%
CS-137	30.2	4%
CO-56	0.2	3%
CM-244	18.1	1%

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Capacity Summary

- The LLRW market has changed, only a small percentage of LLRW requires CWF disposal
- Low Activity Waste (LAW) facilities can dispose of over 90% of decommissioning LLRW
- Operational volumes from in-compact are small (< 3,500 ft^3/y)
- Only about 1 million ft^3 of space is needed for in-compact generators
- Import revenues cover most of the costs, reducing LLRW disposal costs
- Financial viability of the site ensures the CWF will be available when needed

Over 75% of the CWF space and curie capacity is not needed for in-compact LLRW and cannot currently be used for out-of-compact LLRW

DC7

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Native Red Bed Clayrock

- 600 foot thick layer of red bed clayrock
- Hydraulic conductivity is < 4 feet per 1000 years
- Ogallala Aquifer well north of WCS
- 640 wells and borings confirmed - no potable water

Slide 13

DC7 David Carlson, 5/3/2018

Legislative Agenda - 2019

WASTE CONTROL SPECIALISTS

CWF Disposal Rate Setting

- Allow competitive disposal pricing based on market conditions
- Retain rate rule as a ceiling on pricing for in-compact generators
- Untether contract pricing for out-of-compact generators

CWF Disposal Volume Limits

- Maintain necessary reserved volume for in-compact generators
- Increase limits on waste imports
- Remove requirements for volume reduction and for containerization

CWF Disposal Surcharges

- Reduce surcharges to be competitive with Utah surcharges

Reinforced Concrete Barrier

- Remove the design requirement for a concrete liner from the statute

Interim Storage of SNF

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INTERIM STORAGE PARTNERS

- Joint Venture of Waste Control Specialists and Orano (formerly Areva)
- JV was formed to pursue licensing and development of a Consolidated Interim Storage Facility
- NAC is a participant
- License to include storage of Orano TN and NAC systems
- License application is in review at NRC – late 2020 completion target

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GTCC Waste

- WCS Performance Assessment supports disposal of GTCC in the WCS Federal Waste Facility (FWF)
- DOE will complete NEPA documentation
- NRC will issue a Draft Regulatory Basis
- NRC may allow Agreement States (including Texas) to regulate GTCC disposal
- Source of GTCC waste is DOE (Weapons Complex and Commercial)

WASTE CONTROL SPECIALISTS

SW COMPACT WORKSHOP 2018

Introductions

Sherry Frenette
Technical Services Project Manager
sfrenette@wcstexas.com
702-462-9430

WCS Site, Andrews County, TX

WCS Capabilities

Disposal Facilities

Compact Waste Facility (CWF)

- Class A, B, and C containerized LLRW

Federal Waste Facility (FWF)

- Class A, B, and C containerized LLRW and LLMW
- Class A bulk LLRW and LLMW with dose rate < 100 mrem/hr on contact

RCRA Subtitle C Landfill

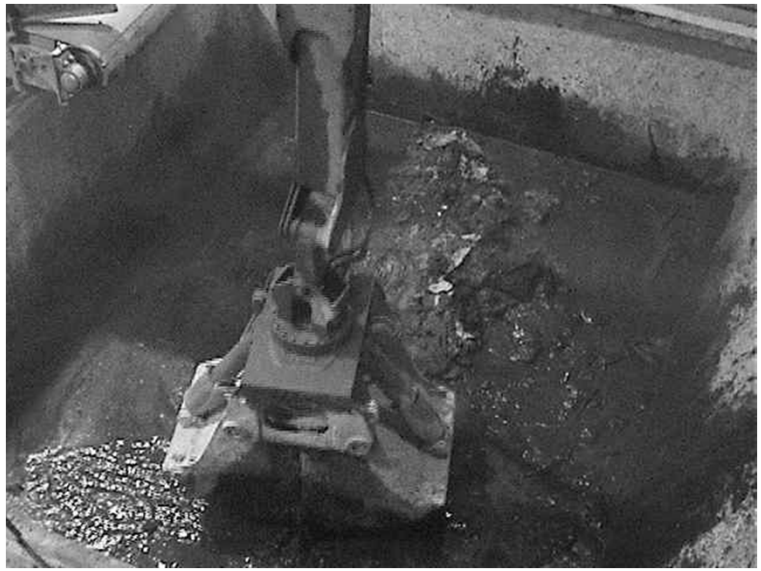
- RCRA Hazardous/Industrial waste
- Class A LLRW and LLMW meeting the concentration limits for acceptance

Note: All disposal facilities can take large components for disposal

WCS Capabilities cont.

Treatment (TSD Facility)

- Sort/segregation and repackaging
- Dewatering/void fill
- Macroencapsulation
- Stabilization/Solidification
- Chemical Oxidation



Low activity waste for disposal at RCRA Landfill

WCS is authorized to dispose of waste meeting specific concentration limits in the RCRA Subtitle C Landfill under LC 192 of RML R04100

- Concentration limits are approximately 10% of the Class A limits

Sampling Requirements

- Generator has characterization sampling requirements that have to meet specific criteria
- WCS has verification requirements upon receipt of the waste

The generator ships the waste as licensed material to a licensed facility.

Export and Import Authorizations

Export

- If you are sending LLRW out of the SW Compact to WCS, you **ALWAYS** need SW Compact export authorization, regardless to which WCS facility you are sending the waste.

Importation- It matters where you dispose of the waste

- If you are sending LLRW to the Compact Waste Facility for disposal, importation authorization from the TX Low- Level Radioactive Waste Disposal Compact Commission (TLLRWDCC) **IS** required.
- If you are sending LLRW to the Federal Waste Facility for disposal, importation authorization from the TLLRWDCC **IS NOT** required.
- If you are sending LLRW to the RCRA Subtitle C Landfill for treatment and/or disposal, importation authorization from the TLLRWDCC **IS NOT** required.

Additional information can be found at www.tllrwdcc.org

WCS accepts shipments via Truck or Rail

Waste Acceptance Criteria

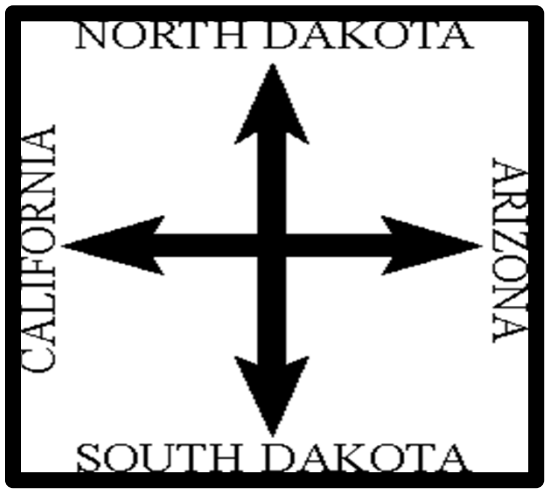
The acceptance criteria varies depending on the waste stream, whether or not the waste requires treatment, and in which facility the waste will be disposed

WCS provides our customers with guidance throughout the process to ensure our generators do what they need to do to make compliant shipments to WCS

- Contracting
- Requirements for importation
- Waste Profiling
- Shipment Requests
- Applicable registrations
- Applicable notifications

Please contact WCS with questions concerning your particular waste stream

Questions?



Kathy Davis, Executive Director**,** SWLLRWCC
Leigh Ing, Executive Director **,** TLLRWDCC

Presented at:
Joint Compact Workshops
October 2018

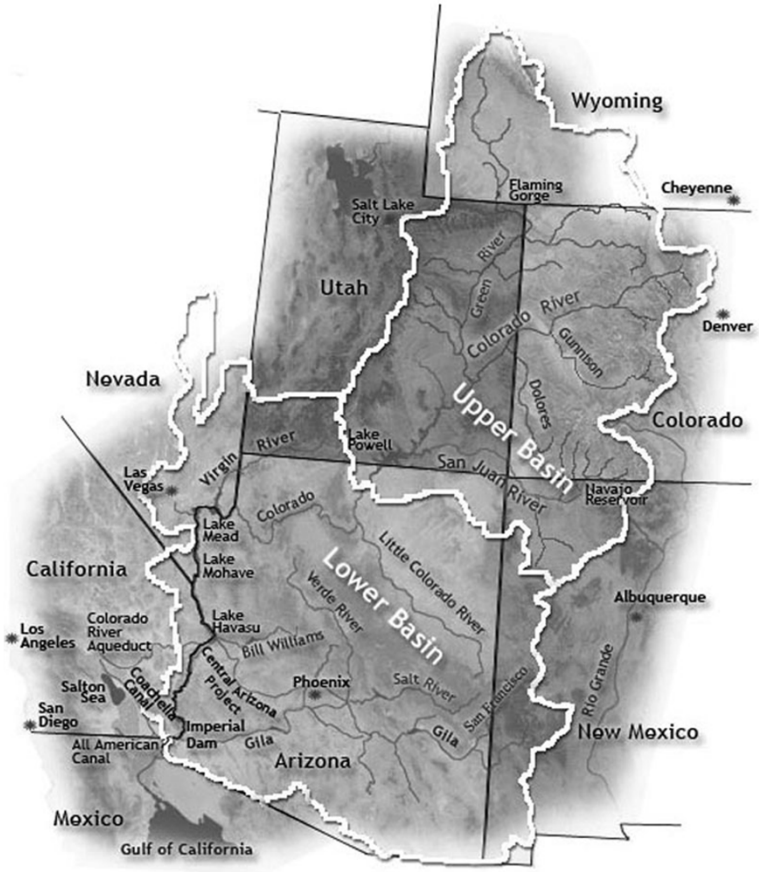
BRIEF OVERVIEW

- What is a Compact?
- What is a Low-Level Radioactive Waste Compact?
- Why are Compacts so different?
- How do we work together to dispose of our waste?

WHAT IS A COMPACT?

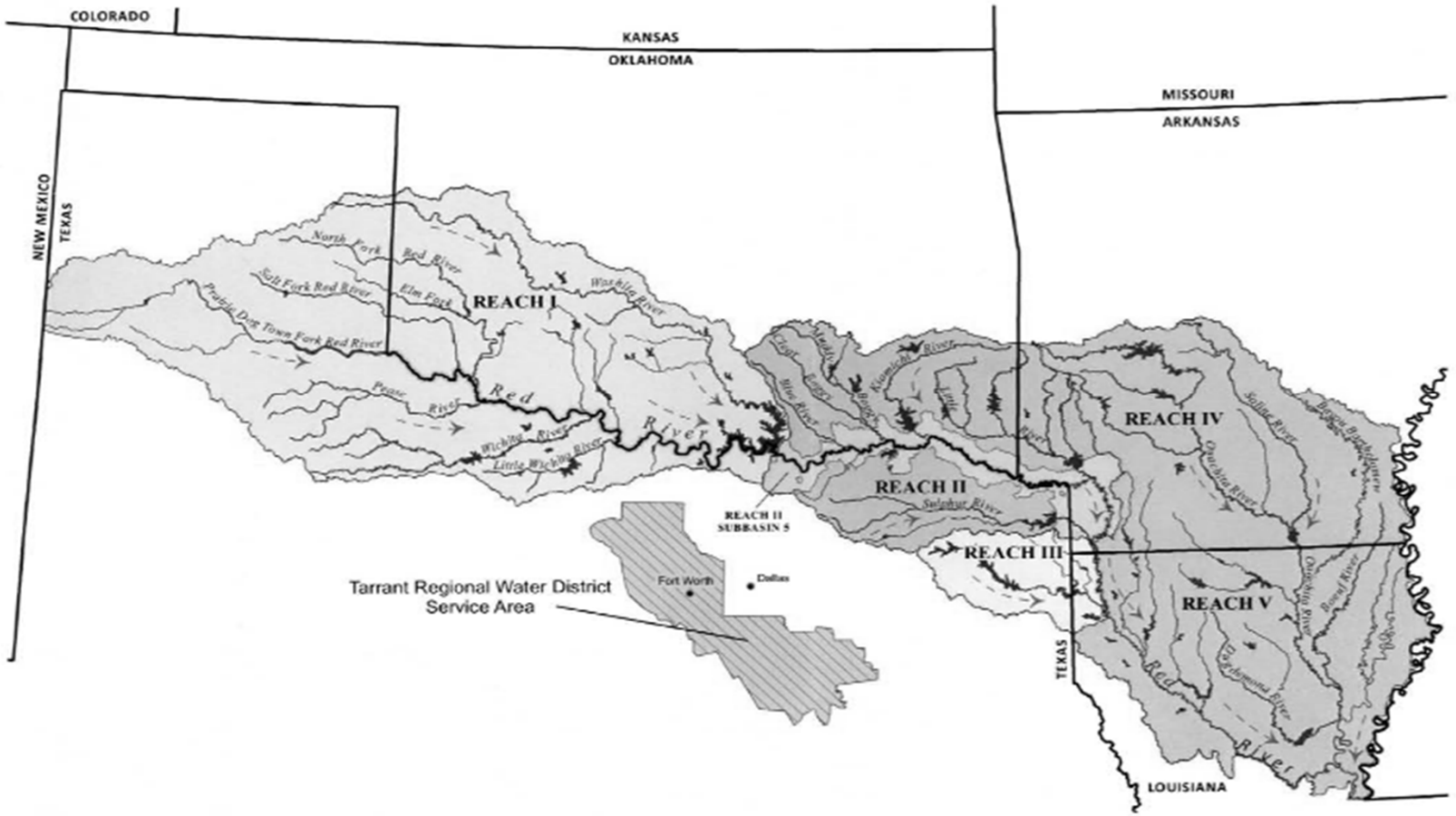
A compact is what a grouping of states form when they think they can manage the task at hand better than the federal government.

A very famous Compact –
The Colorado River Compact of 1922



LI4

Red River Compact



Slide 5

LI4 Kathy, if you wan't to include a California Compact of some sort, just let me know.
Leigh Ing, 10/1/2018

The Drivers License Compact

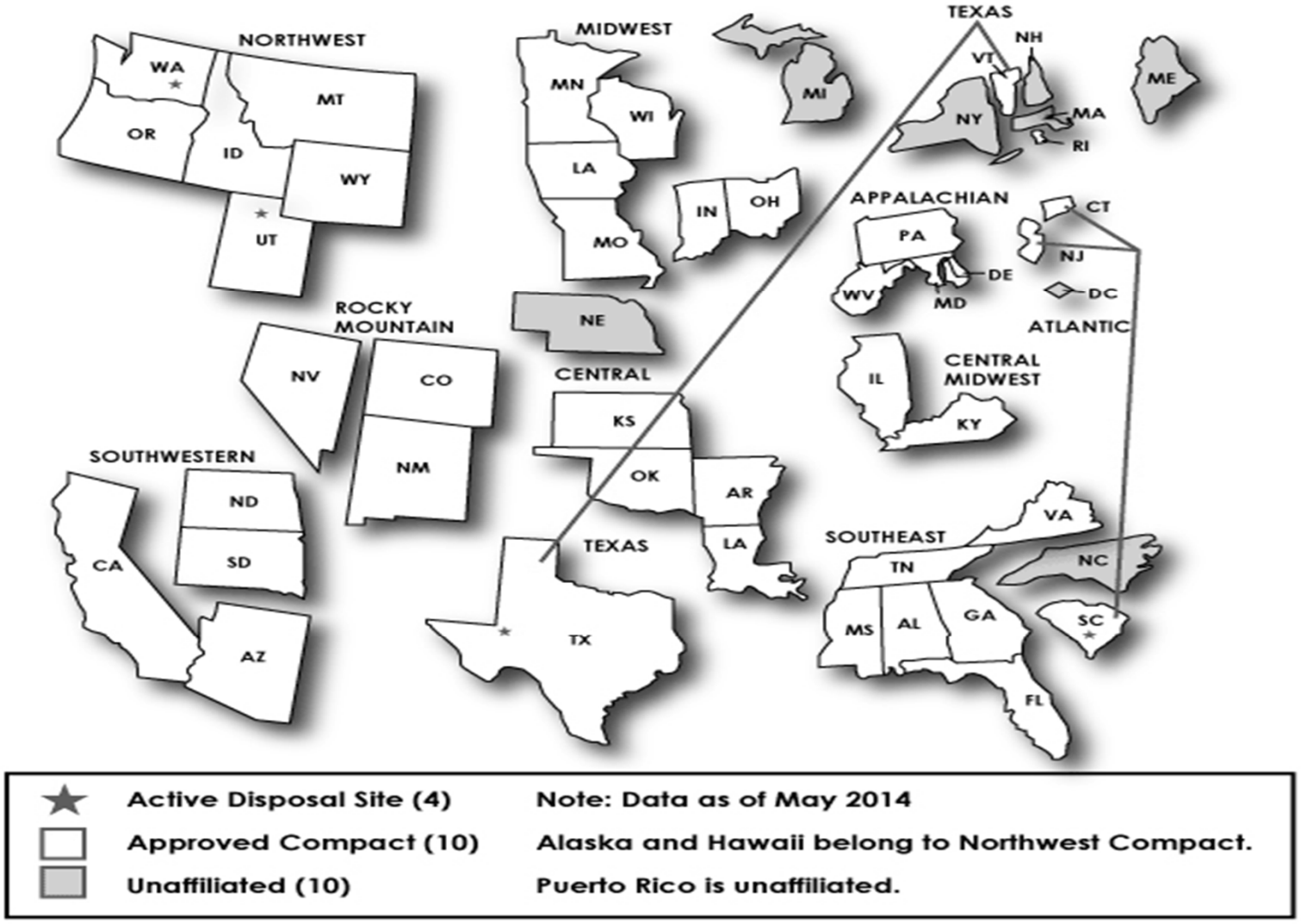
- This compact is used to exchange data between a motorist's home state and a state where the motorist incurred a vehicular infraction.

- As a result a California State Trooper may know of an unpaid traffic ticket in, for example, Illinois.

- All states are members except Georgia, Massachusetts, Michigan, Tennessee and Wisconsin.

Source https://www.aamva.org/drivers-license-compacts/

Low-Level Radioactive Waste Federal Compacts



http://www.nrc.gov/waste/llw-disposal/licensing/compacts.html

Prior to the Compact System

- Access to disposal among states has been evolving since low-level radioactive waste was first generated after World War II.
- Beginning in the 1960s, the United States developed six disposal sites that were fully operational by 1969.
  - Maxy Flats, Kentucky
  - West Valley, New York
  - Sheffield, Illinois
  - Barnwell, South Carolina
  - Beatty, Nevada
  - Richland, Washington

Low-Level Waste Disposal sites in 1993

Source: Idaho National Labs, DOE/LLW103 Rev. 1, 1994

What Caused Low-Level Radioactive Waste Facility Closures?

- West Valley closed in 1975 and Maxy Flats closed in 1977 due to releases of contamination. Sheffield closed in 1978 due to non-renewal of its license and releases of contamination.

- Through the 1970s, the remaining three facilities in those 3 remaining states, pressured the Federal Government to close or to restrict access to those facilities. In 1979, the governors of Nevada, South Carolina and Washington testified in Congress that their states could and would no longer bear the responsibility of the national responsibility of low-level waste disposal.

Facility Access Restrictions

- To address concerns with continued facility closures, the Atomic Energy Act was enacted in 1980 to allow the formation of compacts.
- ***A key component of this legislation is it allows compacts to exclude low-level radioactive waste from other regions. To date, there are 10 compacts.***
- But still no new Compact facilities are built.
- The Beatty y closes in 1992.
- The Richland Facility restricts access to 11 states in 1993.
- The Barnwell Facility restricts access to 3 states in 2008.

Class B & C Low-Level Waste Is No Longer Disposed Of In 36 States

- The nation has 10 compacts, but only three of them have the ability to dispose of Class B & C waste at their facility.
- This leaves 36 states with no access to dispose of Class B and Class C waste.
- This resulted in all Class B & C low-level radioactive waste to be stored on site at Generator's facilities in 36 states, the District of Columbia and the territories of the United States. And yes, this includes Antarctica.

What's happening in California?

The HOST State of the Southwest Compact

WARD VALLEY

- Attempt by California to comply as host state to provide the Southwest Compact a radioactive waste disposal facility.
- Located on BLM land near Needles.

Why Ward Valley?

- The site was selected and approved on sound scientific and technical reasons.

- "Arid area with a thick layer of impermeable rock, a thick unsaturated zone and closed regional drainage basin."

- California did successfully license the Ward Valley site, but ultimately the Federal Government withdrew their approval of a land transfer of BLM land.

The Texas Enters a Compact and Changes the Game.

- The Texas Compact was formed in federal law in 1998
- It is comprised of two states: Texas as the host state and Vermont as the non-host party state. Texas can now restrict access to the Compact Facility.
- In 2012, the Andrews Facility opened its doors to allow for the disposal of Class A, Class B and Class C waste for the compact generators in Texas and Vermont.
- The facility also began importing waste.

Texas Low-Level Radioactive Waste Disposal Compact Commission

- ***This Compact can authorize imports from all compacts or unaffiliated states, territories, possessions, or districts***

- But this Compact must protect the capacity of the Compact Facility for Texas and Vermont generators.

- The Compact Commission can also authorize generators for Texas and Vermont to export out of the compact.

Southwest Compact Exports Low-Level Radioactive Waste

- The Southwest Compact requires generators to be authorized by the Southwest Compact to export low-level radioactive waste out of the Southwest Compact.

- The Texas Compact tracks the import and disposal of low-level radioactive waste into the Texas Compact and correlates these imports with the exports from the Southwest Compact.

- The Southwest Compact has developed a pilot radioactive sealed source recycling project. We also support the SCATR program working with CRCPD & NNSA.

Our Compacts Work Together

- We reconcile exports from the Southwest Compact with imports to the Texas Compact. This allows for safe B & C LLRW disposal.
- Conduct audits to verify authorized shipments to WCS
- Conduct joint workshops.
- We work together on advocacy efforts and information sharing for the benefit of our Compacts.

Southwest Compact Commissioners

- Chair, George Campbell, CA
- Vice-Chair, Donna Early, CA
- Peter Brierty, CA
- Kenneth Vadnais, CA
- Brian Goretzki, AZ
- Dale Patrick, ND
- Nick Emme, SD

The Texas Compact Commissioners

- Chair, Brandon Hurley- TX
- Vice-Chair, John Salsman– TX
- Peter Bradford – VT
- Judge Richard Dolgener - TX
- Linda Morris – TX
- Richard Saudek – VT
- Clint Weber – TX
- Lisa Edwards – TX (Pending)

Thank you for being here!

SWLLRWCC:

Kathy Davis, Executive Director: 916-448-2390

kathydavis@swllrwcc.org

TLLRWDCC:

Leigh Ing, Executive Director : 512-217-8045

Andrew Tachovsky, Deputy Executive Director: 512-791-7576

leigh.ing@tllrwdcc.org or andrew.tachovsky@tllrwdcc.org

Importing Waste to the State of Texas: Navigating the requirements of the TLLRWDCC

J. Andrew Tachovsky, P.E.
Deputy Executive Director

October 23 and 25, 2018

Presentation Overview

- Helpful links to rules and forms
- The application process
- The review process
- Consideration of an application at a Commission Meeting
- Executing the Agreement
- Condition removal letters (CRLs) and Curie release letters (CuRLs)

Helpful links

- Website: http://www.tllrwdcc.org/
- Imports page: http://www.tllrwdcc.org/2018-agreements/
  - This page has other helpful info, such as application deadlines
- How to submit: http://tllrwdcc.wpengine.com/how-to-submit-an-import-application/
- Application pdf: https://texreg.sos.state.tx.us/fids/201503248-1.pdf
- Online application: http://www.tllrwdcc.org/importation-form/
- Term sheet pdf: https://texreg.sos.state.tx.us/fids/201503248-2.pdf
- Rules (TAC): http://www.tllrwdcc.org/rules/
  - Importation of waste is addressed in 31 TAC Part 21 Chapter 675.23

Limitations in statute

- Texas Health and Safety Code (THSC) 401.207 limits the curies that may be disposed to 275,000 Ci annually. This is to preserve disposal capacity for in-compact generators
- https://codes.findlaw.com/tx/health-and-safety-code/health-safety-sect-401-207.html
- This limit is NOT at the discretion of the Commission, and would require a legislative change to Texas law. Compliance with this limit is a key to the Commission review
- To accommodate irradiated hardware apps, the following procedures are in place
  - Irradiated hardware applications must be submitted separately
  - Any application greater than 15,000 curies may be accepted conditionally
  - When shipment is near (1-2 months), applicant will submit a request to release the curies
  - If curies are available, the Commission will provide a letter authorizing shipment
  - First come – first served basis

The application process

The "Musts":

- **You must have an agreement with the TLLRWDCC to import waste**
- Must complete our form (pdf and electronic form on our website)
- Must be willing to enter into an agreement with the TLLRWDCC
- Must send electronic and hard copies to the TLLWDCC, Texas Commission on Environmental Quality (TCEQ), and WCS.
- Certify that you will meet the WAC promulgated by the TCEQ

Filling out the application

Using the pdf

Figure: 31 TAC §675.23(e)(1)

ANNEX A

TLLRWDCC §675.23—IMPORTATION FORM

TEXAS LOW-LEVEL RADIOACTIVE WASTE DISPOSAL COMPACT COMMISSION APPLICATION FOR IMPORTATION OF NON-PARTY LOW-LEVEL RADIOACTIVE WASTE (NOTE: PURSUANT TO TEXAS HEALTH AND SAFETY CODE, §401.207(j), THIS PETITION MUST BE COMPLETED BY APPROPRIATE REPRESENTATIVES OF THE DEPARTMENT OF DEFENSE OR THE GENERATOR OF THE WASTE UNLESS THE GENERATOR IS A SMALL QUANTITY GENERATOR AS DEFINED IN 31 TAC §675.20(19), IN WHICH CASE THE PETITION MAY BE SUBMITTED BY AN APPROPRIATELY LICENSED BROKER) (Article III, Sec. 3.05(7) of the Compact)

I. Applicant Information:

Entity Name: _____

Contact Person, Title: _____

Phone: _____

Email: _____

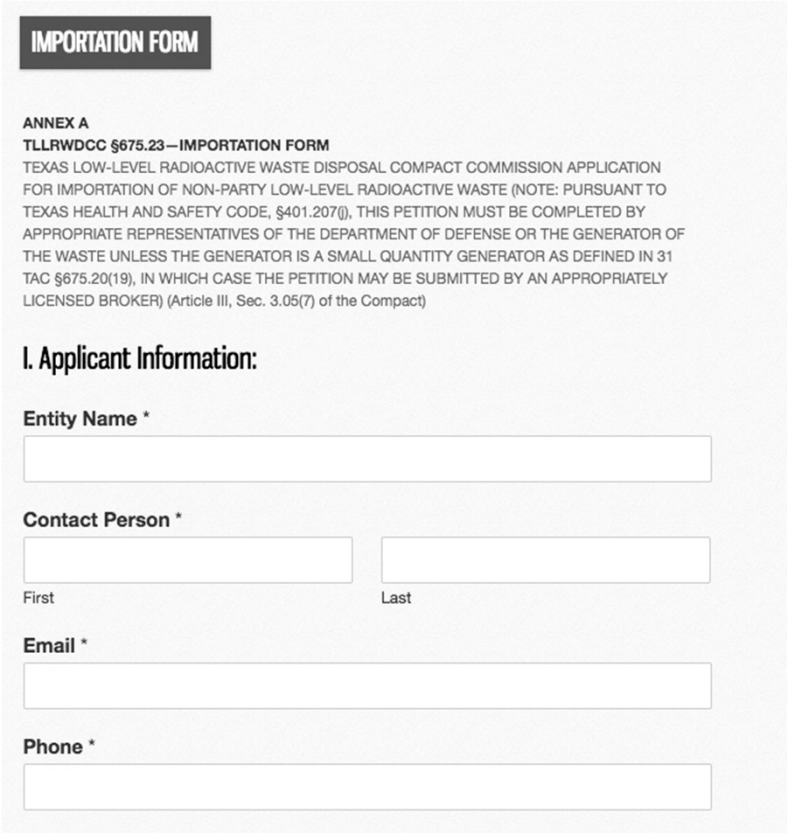
Website: _____

Business Address: _____

_____

_____

Online application



A separate application is needed for Irradiated Hardware

Filling out the application

Information needed

- Entity name
- Point of contact, contact info, website
- Designation – generator vs. broker
- Origin type – industrial, academic, medical, utility, government
- Agreement period (FY is from 9/1 to 8/31)
- Waste volume (cu ft)
- Activity (Ci)
- Waste Classification: Class A, B, C
- Waste form: stable vs. unstable
- Geographic origin of waste (state, compact)
- Sealed sources?
- Waste description
- Unresolved violations
- Certifications
  - Info is complete, accurate
  - Waste is not international
  - Packaging and shipping according to regs
  - Submitter is authorized by applicant
  - Copy to TCEQ and WCS
- Signature
- Attachments (if any)

Application submitted, what's next?

- Application posted within 5 days of submittal
- TLLRWDCC will contact you with any questions or clarifications
- TCEQ will conduct their review of the application and provide a letter to the TLLRWDCC indicating recommendation (or not)
- Application and TCEQ letter to TLLRWDCC technical review team, who produce a memo for the Commissioners
- Any comments must be received within 1 week of the next commission meeting. Comments received outside this window are optional
- Decision by the commission must be made within 35-100 day window
- Generally, Commission meetings fall on a 6 week schedule. Sometimes the meeting date will be pushed if < 5 applications received

The Commission review process

There are 13 criteria listed in 31 Texas Administrative Code 675.23

- Volume, type, physical form, and total radioactivity
- Policy and purpose of the Compact
- Economic impact
- Authorization from the TCEQ
- Impact on Compact facility's total annual volume
- Unresolved violations with TLLRWDCC
- Unresolved violations with any other agencies
- Any comments received
- Generator and authorizations needed
- Projected effect on rates to be charged
- Annual and total volume and curie capacity disposal limits
- Compliance with rules related to comingling adopted by the TCEQ
- Any other factors

At the Commission meeting

- An agenda for the meeting is posted 9 days prior
- Applications are considered one at a time
- The vice-Chair presents the application and the recommendations of the technical team review
- There is discussion among Commissioners as necessary
- There is an opportunity for public comment
- There is a vote on the application – approve, approve with conditions, request additional info, deny

Questions often come up that only the applicant can clarify. For this reason, it is highly recommended that any applicant attend the Commission meeting where their application will be considered!

After the Commission meeting

- Approved? The following steps are next
  - TLLRWDCC prepares an agreement for signature including terms discussed and voted upon (generally 1-2 weeks)
  - Signed by the Chairman, sent to Applicant for signature
  - Signed by Applicant, sent back to the Commission
  - Commission posts to website (process complete in 3-4 weeks)
- In a rush? If you let the Commission know ahead of time, we can take steps to expedite the process.
- If you are a generator requesting <15,000 Ci, there are no further Commission related barriers to shipping your waste
- If you are a broker or wish to ship >15,000 Ci, you have additional steps (next slide)
- Denied? You can refile immediately if you wish.

Brokers and big shipments

Brokers:

- Need to provide generator authorizations and Compact authorizations (where appropriate) to the TLLRWDCC before shipping. This is a condition of the agreement.
- Send in a request (email is fine) and attach all necessary info. The Commission will review and issue a "Condition Removal Letter" (CRL)
- The CRL is posted to the website, and provided to broker and WCS

Shipments > 15,000 Ci

- Send letter to request release of Curies. Include schedule and description of waste. Email is fine.
- Commission will review and issue a "Curie Release Letter" (CuRL), which is posted to the website, and provided to generator and WCS

Amendments

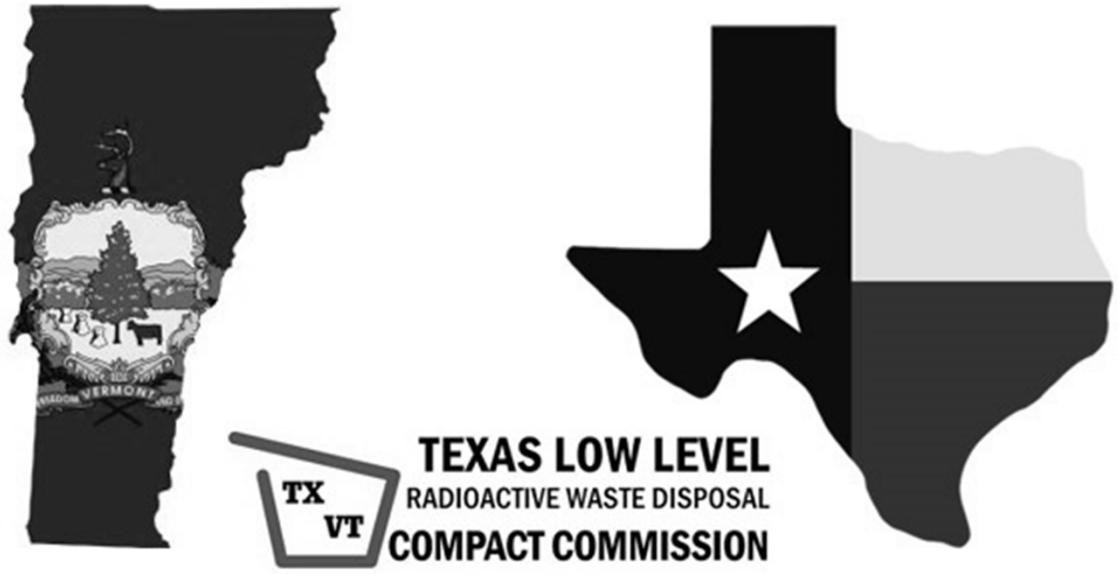
- Need additional Curies or cubic feet? This is an amendment to your agreement. Send in a letter with your request.
- An amendment follows generally the same review process as an application, and is voted upon by the Commission at a meeting.
- There is a minor amendment, which can be much faster. According to the statute: the following changes are minor amendments:
  - Inclusion of additional compacts, unaffiliated states, territories, possessions, or districts of the United States from which waste will be shipped
  - Inclusion of an additional waste stream
  - Change in waste form
  - Inclusion of an additional type of generator
- Applicants can not "declare" that a change is minor. That is the discretion of the Chairman

Keeping in good standing

You've been through the process and have an agreement in hand. That's good news!

<u>Please read your agreement</u>

There are conditions of the agreement and reporting requirements in there that can put you out of compliance and cause problems with future applications submitted to the Commission.



Thank you for being here!

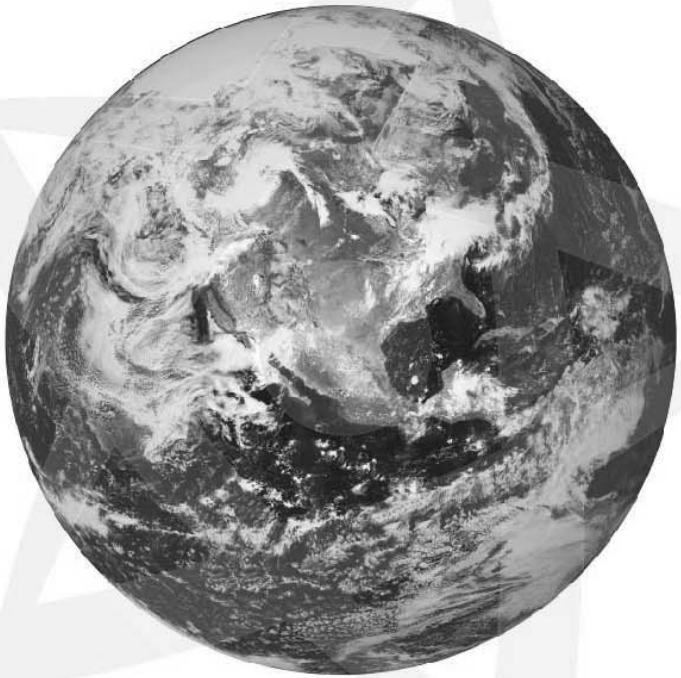
Andrew Tachovsky, Deputy Executive Director: 512-791-7576

Leigh Ing, Executive Director : 512-217-8045

andrew.tachovsky@tllrwdcc.org or leigh.ing@tllrwdcc.org

ORS
Office of Radiological Security
Protect · Remove · Reduce

Office of Radiological Security Update: End-of-Life Management of Sealed Sources



SWLLRWCC & TLLRWDCC

2018 California Workshops

October 2018

National Nuclear Security Administration

Global Material Security

ORS
Office of Radiological Security
Protect · Remove · Reduce

Introduction – NNSA/ORS

National Nuclear Security Administration

ORS
Office of Radiological Security
Protect · Remove · Reduce

Office of Radiological Security

MISSION: The Office of Radiological Security enhances global security by preventing high activity radioactive materials from use in acts of terrorism.

PROTECT

PROTECT radioactive sources used for vital medical, research, and industrial purposes

REMOVE

REMOVE and dispose of disused radioactive sources

REDUCE

REDUCE the global reliance on radioactive sources by promoting the adoption and development of non-radioisotopic alternative technologies

NNSA National Nuclear Security Administration
Global Material Security

NNSA Office of Radiological Security

Lifecycle Approach to Sealed Source Security

Source manufacture (PROTECT)

- Security by device design

Transportation, use, and storage (PROTECT)

- Facility security enhancements
- Mobile source tracking
- Transportation security
- Alarm response training

End of life management and replacement (REMOVE & REDUCE)

- Recovery and disposal of sources
- Replacement with alternative technologies

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Radioactive Materials of Greatest Concern

- ~15 radionuclides used commercially in quantities large enough to create a significant Radiological Dispersal Device (RDD)
- ~99% of the risk significant sources used commercially in the U.S. are Am-241, Cs-137, Co-60, or Ir-192

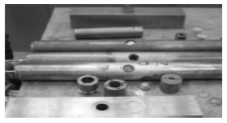
Radionuclide	Category 2 Threshold (Ci)
Am-241	16
Cf-252	5
Cm-244	14
Co-60	8
Cs-137	27
Gd-153	270
Ir-192	22
Pm-147	11,000
Pu-238	16
Pu-239/Be	16
Ra-226	11
Se-75	54
Sr-90	270
Tm-170	5,400
Yb-169	81

Am-241:
Oil well logging (industrial imaging)

Ir-192:
Radiography (industrial imaging)

Cs-137:
Self-shielded irradiators (research and sterilization), brachytherapy (cancer treatment), and calibrators

Co-60:
Teletherapy and Gamma Knife units (cancer treatment), self-shielded and panoramic irradiators (research and sterilization)



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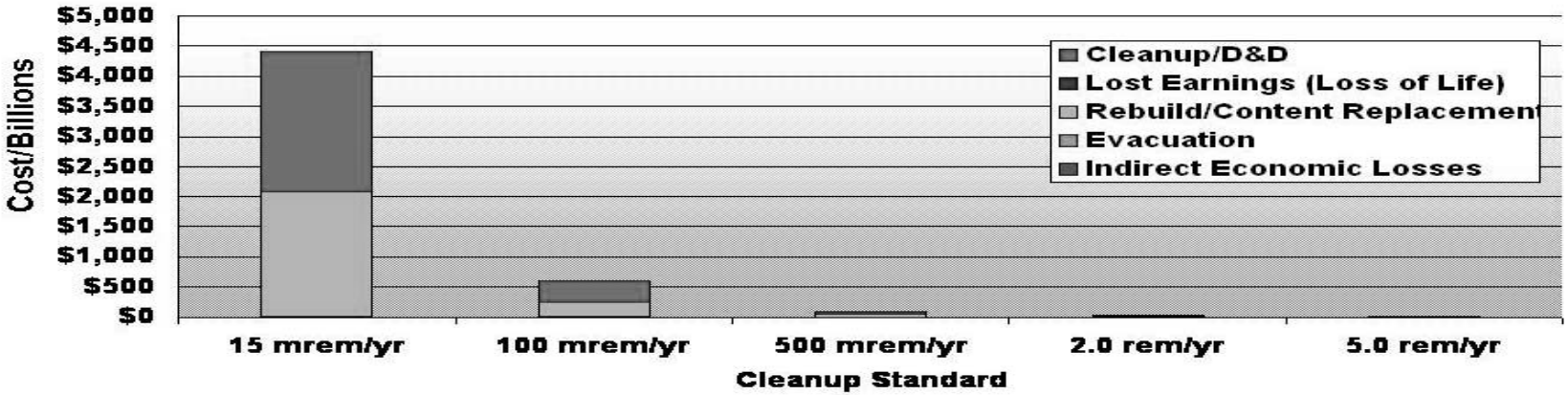
Radioactive Material and RDDs

- Terrorist groups have actively sought radiological materials and the expertise needed to weaponize them
  - Recent consideration of cyber security in threat and vulnerability assessments (i.e., potential compromise of facility security systems)
  - In the past 18 months there have been 5 instances of loss or theft of IAEA Security Category 1 to 3 sources in the U.S. (and nearly 100 instances of Category 4 and 5 sources)
  - RDDs represent a low-probability high-consequence risk



10-kCi Cs-137 Detonation in New York City

Source: Reichmuth, Barbara., Steve Short, Tom Wood, Fred Rutz, Debbie Schwartz, *Economic Consequences of a Rad/Nuc Attack: Cleanup Standards Significantly Affect Cost*, Richland, WA: Pacific Northwest National Laboratories, PNNL-SA-45256, 2005, Figure 9.

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NNSA ORS/Remove – Recovery and Disposal of Disused Sealed Sources

- Sources are most at risk of loss or theft when in transit or in long-term storage
- ORS encourages and supports the timely disposal of disused sources

"Every year, thousands of sources become disused and unwanted in the United States. While secure storage is a temporary measure, the longer sources remain disused or unwanted, the chances increase that they will become unsecured or abandoned. Thus, permanent disposal is essential."

2010 Report of the NRC Radiation Source Protection and Security Task Force

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Radioactive Materials of Greatest Concern

Common IAEA Category 1 to 3 Sealed Sources

Device/Use	Isotope	Typical activity per source/device (Ci)	IAEA Category
Blood/Research Irradiation	Cs-137	600 – 3,000	1
	Co-60	1,500 – 30,000	1
Gamma Knife	Co-60	5,000 – 7,000	1
Teletherapy	Co-60	5,000 -10,000	1
	Cs-137	500	1
Industrial Radiography	Co-60	60 – 100	1
	Cs-137	10	3
	Ir-192	100	2
Calibration	Co-60	20	2
	Cs-137	120 – 1,200	1
	Am-241	10	3
Industrial Gauges	Co-60	1 - 5	3
	Cs-137	2 - 5	3
Well Logging	Am-241/Be	5 - 20	2/3
	Cs-137	2-5	3

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Source Reduce Update

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NNSA ORS/Reduce Update - Cesium Irradiator Replacement Project (CIRP)

The NNSA ORS Cesium Irradiator Replacement Project (CIRP) provides cost-share support to licensees who choose to replace Cs-137 irradiators with alternative, non-radioisotopic technologies

- **Participant sites receive:**
  - Removal of the Cs-137 device through OSRP
  - Cost-share for the purchase of an X-ray device
  - Cost-share payable after procurement of the X-ray device and removal of the Cs-137 device
- **Participant sites are responsible for:**
  - Identifying which non-isotopic device to procure
  - Initial purchasing of the replacement device
  - Coordinating of x-ray device device delivery, installation, and commissioning
  - Registering their Cs-137 device on the OSRP website
  - Signing an ORS disposition/sustainability statement

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NNSA ORS/Reduce – Cesium Irradiator Replacement Project (CIRP)

- The 2019 National Defense Authorization Act (NDAA) directs the NNSA to target elimination of all domestic Cs-137 blood irradiators by 2027
  - Stipulates a 50% cost-share for replacement devices and recovery/disposal by by OSRP; ***However, the program remains entirely voluntary***
- To meet the NDAA metric, NNSA ORS is targeting ~70 replacements per year
  - The program currently has participant comments to hit this target for the next several years
  - To date, 62 Cs-137 blood and research irradiators have already been replaced with x-ray devices
- University of California System replacement initiative:
  - The UC System has 36 Cs-137 research irradiators and 6 blood irradiators at 10 campuses
  - In 2017, the research/medical staff agreed to assess the feasibility of replacement
  - Initial determination: 38 Cs-137 irradiators will likely be removed by OSRP and replaced by 28 x-ray devices
- New York City:
  - ORS has received commitments to replace approximately 80% of NYC licensed irradiators, including 100% of the blood irradiators.

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Disused Source Recovery and Disposal

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IAEA Source Safety/Security Categories and NRC Waste Classes

IAEA safety/security categories and NRC waste classes not directly correlated

- IAEA source categorization
  - Protection during use and storage
  - Current activity is the primary determinant
- NRC 10 CFR Part 61 waste classes
  - Protection of the inadvertent intruder in the future
  - Half-life is the primary determinant

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Home > NRC Library > Document Collections > NRC Regulations (10 CFR) > Part Index > § 61.55 Waste classification.

§ 61.55 Waste classification.

(a) Classification of waste for near surface disposal. (1) *Considerations.* Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(2) *Classes of waste.* (i) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in § 61.56(a). If Class A waste also meets the stability requirements set forth in § 61.56(b), it is not necessary to segregate the waste for disposal.

(ii) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth

(iii) Class C waste is w
but also requires additi
form and characteristic
61.56.

(iv) Waste that is not g
must be different, and
requirements in this pa
chapter unless proposa
the Commission.

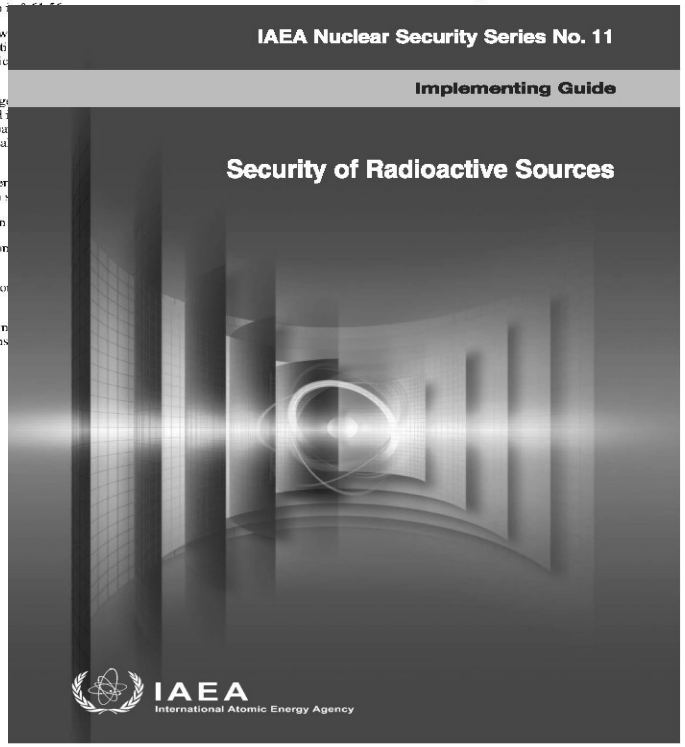
(3) Classification deter
Table 1, classification

(i) If the concentration

(ii) If the concentration
Class C.

(iii) If the concentrati
disposal.

(iv) For wastes contain
by the sum of fractions



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Commercial Sealed Source Disposal Challenges

- Commercial disposal of sources historically challenging in two ways:
  - Disposal facility access constraints
  - Source activity constraints
- Significant progress in the first:
  - Nationwide access to WCS in Texas since 2012
  - Access for generators in 36 States previously with limited or no commercial options
- Source activity constraints remained:
  - Class B and C gamma sources exceeding 30Ci
  - Greater-than-Class C (GTCC) waste

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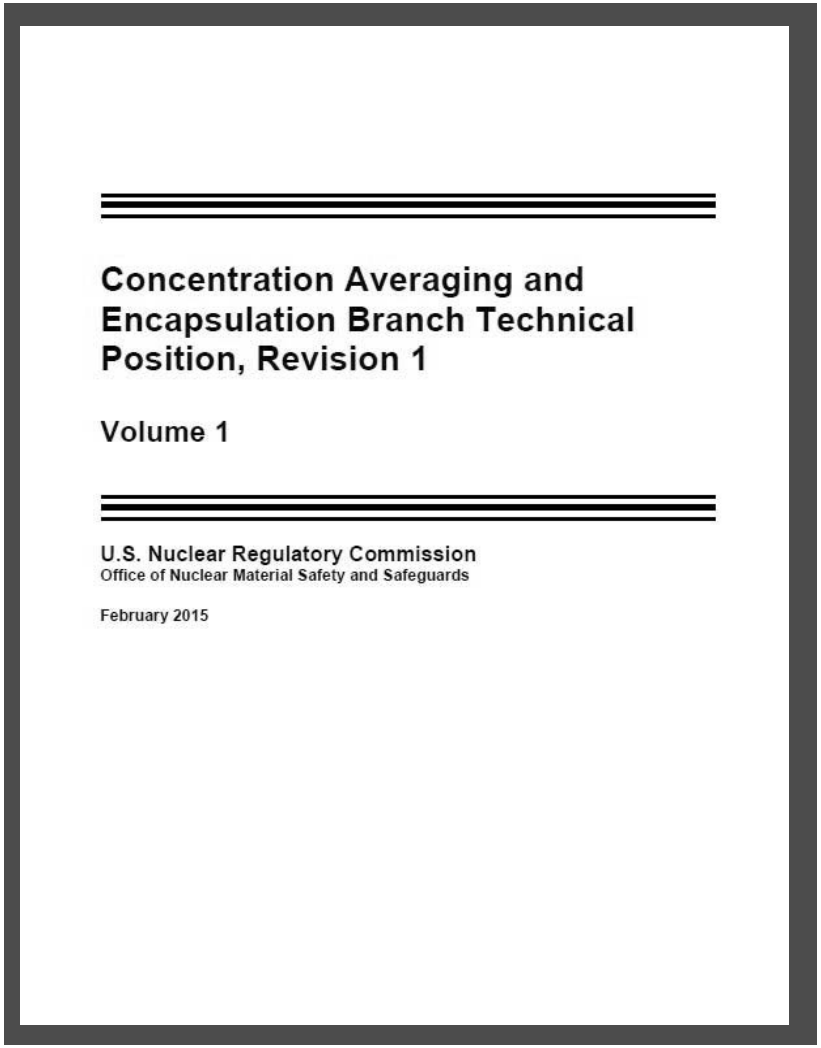
Sealed Source Disposal Access

- 2015 NRC revised disposal guidance:

  "Concentration Averaging and Encapsulation Branch Technical Position"

  - Addresses near-surface LLRW disposal activity limits – i.e., Class A, B, and C waste
  - 1995 version effectively set a 30Ci source disposal limit

- Update includes significantly revised sealed source disposal provisions:
  - Cs-137 'generic' Class C limit for sealed sources increased from 30Ci to 130Ci
  - Co-60 sources addressed explicitly – no Class B/C limit
  - 'Alternative approach' provisions that address higher activity Class C sources



Concentration Averaging and Encapsulation Branch Technical Position, Revision 1

Volume 1

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

February 2015

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Source Categories and Waste Classes

- Commercial disposal now available for most sealed sources as Class A, B, and C waste:
  - WCS in Texas and US Ecology in WA accept Class A, B, and C sealed sources in accordance with the most recent NRC guidance
  - Disposal of Cs-137 self-shielded devices up to ~957Ci Class C limit likely using NRC 'alternative approach disposal' guidance
- Greater-than-Class C (GTCC) commercial facility development/licensing still pending

Common Sources and Commercial Disposal Availability

Type	IAEA Category 2	Category 2 Disposal	Category 1	Category 1 Disposal
Am-241	16Ci	GTCC	1,600Ci	GTCC
Cs-137	27Ci	C	2,700Ci	GTCC
Co-60	8Ci	A	800Ci	B
Ir-192	22Ci	A	2,200Ci	A

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NNSA ORS/Remove – Recovery and Disposal of Disused Sealed Sources

- **NNSA/ORS Off-Site Source Recovery Project (OSRP)**
  - Recovery and disposition of disused sources in the interest of national security, public health, and safety
  - Primarily sources exceeding commercial disposal thresholds
  - Recovery prioritization – threat reduction criteria developed in coordination with the NRC
  - OSRP is administered by the Los Alamos and Idaho National Laboratories

Register your sources at:
http://osrp.lanl.gov/PickUpSources.aspx

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NNSA ORS/Remove – Recovery and Disposal of Disused Sealed Sources

- Source Collection and Threat Reduction Program (SCATR)
  - Administered by the Conference of Radiation Control Program Directors (CRCPD)
  - CRCPD-SCATR provides cost-share support & technical assistance for commercial disposal of sealed sources
  - Cost share amount currently set at 20%

Collection Years	Total Sources	Cost-Share
2013-2015	8,437	50%
2015-2016	4,755	45%
2016-2017	3,972	40%
2017-2018	2,382	30%
2018-2019	489 (thru 10/1/18)	20%

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Registration of sources for SCATR also located at: http://osrp.lanl.gov/PickUpSources.aspx

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NNSA ORS/Remove – Recovery and Disposal of Disused Sealed Sources

- 2017 NNSA/CRCPD Concentration Averaging (CA) Branch Technical Position (BTP) 'Alternative approach' pilot
  - Disposed of a ~560Ci Gammacell irradiator at US Ecology in WA using an approach that could enable future similar disposals by licensees
  - Approach based on site and waste-specific characteristics such as source/device design, disposal depth, intruder barriers, and disposal configuration
- In 2016 and 2018 NNSA ORS completed NRC certification of two new Type B transportation containers to facilitate the recovery and disposal of sealed sources
  - The 435-B is an unshielded overpack for domestic and international use
  - The 380-B shielded container primarily for domestic recoveries
  - NNSA is making the container designs available to interested commercial entities for use or modification

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Radiation Source Protection and Security (RSPS) Task Force and the 2018 Task Force Report

- Radiation Source Protection and Security Task Force was created by the 2005 Energy Policy Act to coordinate Federal sealed source security efforts
- Mandate to asses certain topics including:
  - Source security, commercial disposal access, financial assurance, and implementation of alternative technologies (among many others)
- The Task Force is chaired by the NRC; membership includes 14 Federal agencies and State representation (OAS)
  - The Task Force reports every four years to the President and Congress on progress and new recommendations, if appropriate
  - The Task Force updates an implementation plan between reports, which is also available on the NRC website

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Radiation Source Protection and Security (RSPS) Task Force and the 2018 Task Force Report

- The 2018 Report ~~remains in the final stages of the Federal concurrence process~~; report development included:
  - Evaluation of progress on the 11 open recommendations from the 2006, 2010, 2014 reports [4 closed]
  - Consideration of potential new recommendations [None]
- The Task Force considered developments since 2014 related to source management and disposal, including:
  - Expansion of commercial disposal access for Category 1 and 2 sources including the updated CA BTP and progress toward GTCC disposal
  - The 2016 NRC Staff Recommendation to the Commission to initiate rulemaking on financial assurance for Category 1 and 2 sources
- Additional developments/considerations included implementation of Part 37, cyber security, transportation security, and import/export controls

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Source Collection and Threat Reduction Program | 2018-19 SCATR

2018-19 CRCPD/SCATR Source Collection and Disposal Opportunity

The Conference Radiation Control Program Directors (CRCPD) Source Collection and Threat Reduction (SCATR) Program has begun its 2018-19 unwanted radioactive sealed source collection and disposal effort. CRCPD/SCATR provides cost-shared support for the packaging, transport, and commercial disposal of Class A, B, and C sources. SCATR receives funding through a grant provided by the Department of Energy (DOE) National Nuclear Security Administration (NNSA).

SCATR is targeting a 20% cost-share amount for 2018-19 program participants. Licensees in all 50 States and U.S. territories are eligible for program participation.

> ***Note:*** *Cost-share targets are set on an annual basis. However, the cost-share amount is expected to decrease from current levels each year going forward. While the program makes every effort to assist as many eligible generators as possible each year at the targeted cost-share amount, the cost-share support available, as well as the number and location of sources collected, are subject to funding, logistic, and other considerations.*

To qualify for SCATR participation, licensees must register their disused and unwanted sources with the Los Alamos National Laboratory (LANL) Off-Site Source Recovery Program (OSRP) at:

http://osrp.lanl.gov/PickUpSources.aspx

Interested licensees are encouraged to complete source registration as soon as possible. Source registration does not imply a commitment by either the generator or CRCPD with regard to program participation. CRCPD selects participants, in part, based on the number of sources the generator has registered with OSRP/LANL. However, any previously registered party is encouraged to contact the person listed below to request to participate. All registered parties are encouraged to request a copy of information about their facilities and source inventory to determine if the information in the SCATR database is accurate and up to date.

For more information on CRCPD/SCATR or the 2018-2019 national SCATR collection, please contact **Russ Meyer at 512-761-3822, rmeyer@crcpd.org**

International Activities

OSRP staff cooperates with international organizations and countries for repatriation of radioactive sources to their country of origin, particularly repatriation of US-origin material.

OSRP has worked with more than seventy countries, from Albania to Zambia, providing source recoveries, training, site assessments, and other services, through NNSA and other entities, such as the International Atomic Energy Agency (IAEA).

If You Have Excess or Unwanted Sources

Licensees should register all excess and unwanted radioactive sealed sources with OSRP for recovery consideration.

OSRP recovers US-origin transuranic sources and high-activity beta/gamma devices that are not commercially disposable. Recoveries are prioritized on the basis of activity level at the location. Where numerous sources of lower activity are present at a single location, consideration may be given to the total activity from a security perspective.

You can register sources even if they are still in use or do not qualify for recovery by OSRP. Our staff can assist you in managing your disused sources and planning for future disposal.

Source Registration is Easy and Free!

Register unwanted sources online using the registration instructions provided on our website:
http://osrp.lanl.gov

Questions about source registration may be directed to OSRP by calling toll free 877-676-1749 or sending email to osrp@lanl.gov.

Contact OSRP

Los Alamos National Laboratory
PO Box 1663, Mail Stop: E539
Los Alamos, NM 87545

Phone: (505) 606-0362
Toll Free: (877) 676-1749
Fax: (505) 665-7913
Email: osrp@lanl.gov
http://osrp.lanl.gov

In some cases legal reuse and recycling is possible and is encouraged by NNSA and OSRP. Registration does not imply nor guarantee that the program can assist with removal/disposition of all radioactive material.

LA-UR 12-00002

OFF-SITE SOURCE RECOVERY PROGRAM

NATIONAL SECURITY THROUGH SOURCE REMOVAL

OFF-SITE SOURCE RECOVERY PROGRAM

What is OSRP?

The Off-Site Source Recovery Program (OSRP) has a National Nuclear Security Administration (NNSA) sponsored mission to recover excess, unwanted, and abandoned radioactive sealed sources that pose a potential risk to national security, public health, and safety.

OSRP contributes to national security by eliminating from the environment excess radioactive sources that could be used in a Radiological Dispersion Device ("dirty bomb") or for any other malicious purposes. The program is part of NNSA's Office of Radiological Security.

- **Since 1997, OSRP has removed over 37,000 radioactive sealed sources totaling more than 1.1 million Curies of material from over 1,300 industrial, educational, healthcare, and government facilities worldwide.**
- **The program recovers and secures an average of roughly 2,000 sources each year from US-domestic locations.**
- **Recovered sources are prepared and packaged for disposition at DOE-authorized disposal facilities in the US, and transported in accordance with applicable regulations.**
- **OSRP can assist with sealed source identification, packaging, transportation, secure storage and disposition; all in accordance with regulatory requirements.**
- **OSRP collaborates with DOE/NNSA to provide instruction and training on radioactive source search and secure techniques to other countries' regulatory authorities.**
- **OSRP personnel provide training to foster an overall awareness of the need to ensure security of radioactive sources at all levels of use, storage, and transportation.**

Los Alamos NATIONAL LABORATORY EST. 1943

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INL Idaho National Laboratory

"We recently decided to use X-ray instead of cesium irradiators in our new building. Mount Sinai is proactively looking at alternative technologies and will, hopefully, phase out all radioactive material as time goes by."

– Jacob Kamen, PhD,
Senior Director Radiation Safety, Mount Sinai

About ORS

The Office of Radiological Security provides world-class security resources and technologies to businesses that utilize radioactive sources.

For more information, contact:
ORSInfo@nnsa.doe.gov.

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Cesium Irradiator Replacement Project

Learn More About Permanent Risk Reduction and Incentives Offered by ORS.

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Cesium Irradiator Replacement Project

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) Office of Radiological Security (ORS) is working with domestic users of cesium-137 based irradiators who are interested in converting to viable non-radioisotopic alternatives. The Cesium Irradiator Replacement Project, offered by ORS, provides qualified sites who are interested in making the switch with a financial incentive towards the purchase price of a new non-radioisotopic device, as well as the removal and disposal of the cesium irradiator. The Project was launched in 2014, and is supported by the United States' commitment to facilitate the replacement of 34 cesium-137 irradiators with non-radioisotopic alternatives by 2020.

Qualified participants will receive:

- Removal and disposal of the cesium-137 irradiator, saving the site approximately $100–$200k per irradiator.
- A limited financial payment towards the purchase of the new non-radioisotopic device, up to 50% of the purchase price. The payment will be disbursed when the cesium device has been removed and the non-radioisotopic device has been installed.
- Training, warranty/maintenance agreement costs, and spare part costs are the responsibility of the site.

Considerations for Cesium Irradiator Replacement

While radioactive sources play an important role in commercial, medical, and research facilities, the benefits of these sources must be balanced with sufficient security to prevent radiological materials from falling into the wrong hands.

Effective security for high-activity radioactive sources, such as cesium-137, requires expertise, security systems, and compliance with additional regulatory requirements.

Sites using radioisotope-based irradiators should consider several factors when exploring replacement with non-radioisotopic alternatives including:

- Equipment reliability.
- Ease of use.
- Operational protocols.
- Costs including device procurement, warranty and maintenance, infrastructure, and security costs.
- Potential liability.
- Unique user requirements.

Thanks to the maturation of technology, viable alternatives to cesium irradiators are now available and have proven to be comparable or even more effective than cesium for both research and blood irradiation in some cases. These alternatives have already been adopted and are in use by many facilities throughout the U.S. Benefits of non-radioisotopic irradiators include:

- Mitigation of security risks and costs associated with cesium-137.
- Elimination of the liability risk associated with cesium-137 devices.
- Consistent throughput over the lifetime of the device, whereas cesium-137 irradiators require longer irradiation time as the cesium source decays.

Replacing your cesium irradiator with a non-radioisotopic alternative may offer your enterprise an opportunity to meet cost and throughput needs while permanently reducing security risks.

The Office of Radiological Security

ORS works to prevent high-activity radiological materials from being used in acts of terrorism. ORS uses three strategies to enhance global radiological security:

- Protect radioactive sources used for vital medical, research, and commercial purposes.
- Remove and dispose of disused radioactive sources.
- Reduce the global reliance on high-activity radioactive sources by promoting the adoption and development of non-radioisotopic alternative technologies.

How Can You Learn More?

For further information on the Cesium Irradiator Replacement Project and to discuss whether and how the Project could work for your site, please contact ORS at ORSInfo@nnsa.doe.gov.

"By implementing the X-ray irradiator, OneBlood has further enhanced the safety of the blood supply and increased the security of our facilities. At the same time, the X-ray irradiator has enabled us to increase our blood irradiation throughput and has exceeded our expectations for performance and reliability." *– Alicia Belldo Prichard, OneBlood, Inc.*