FEMA/NRC/TEMA Southeast Radiological Emergency Preparedness Workshop

Nashville, TN, February 10th – 12th, 2020

U. S. Department of Agriculture Capabilities and Resources for Response and Recovery from a Radiation Release

Gordon Cleveland
USDA APHIS Veterinary Services
Office of Science and Interagency Coordination
Advisory Team for Environment, Food, and Health

USDA Responsibilities: Nuke-RAD Incident Annex to the NRF:

- Assists in the planning and collection of agricultural samples within the Ingestion Exposure Pathway
- Assesses damage to crops, soil, livestock, poultry, and processing facilities and incorporates the findings in a damage assessment report.
- Assists in the evaluation and assessment of data to determine the impact of the incident on agriculture.

USDA Responsibilities: Nuke-RAD Incident Annex to the NRF:

- Inspects and assists in the collection of samples of crops, meat and meat products, poultry and poultry products, and egg products to ensure that they are safe for human consumption.

- Provides support and advice on screening and decontamination of pets and farm animals that may have been exposed to radiation or contaminated with radioactive materials

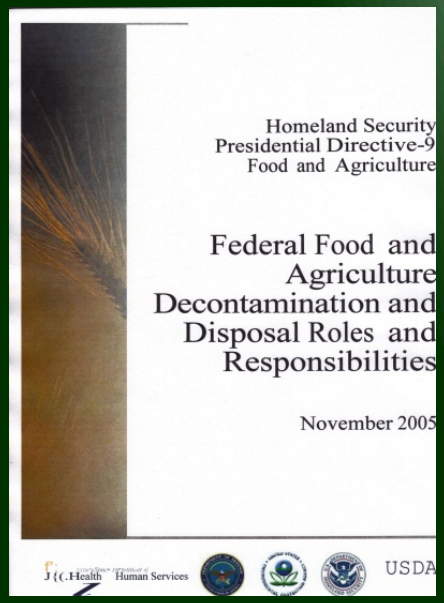
USDA Responsibilities: Nuke-RAD Incident Annex to the NRF:

- Assists, in conjunction with HHS, in monitoring the production, processing, storage, and distribution of food through the wholesale level to eliminate contaminated product and to ensure that the levels of contamination in the product are safe and below the derived intervention levels (DILs).

- Assists in the planning and operational aspects of animal carcasses disposal.

USDA Responsibilities: Nuke-RAD Incident Annex to the NRF:

- Provides support and advice and assists in the planning and operational aspects of animal carcasses disposal.
- OOPS!!
  - Radiologically contaminated carcasses and other agricultural materials are HAZMAT and the responsibility of EPA
  - Document describes general Federal (USDA APHIS) roles and responsibilities for decontamination and disposal of agricultural products


Homeland Security
Presidential Directive-9
Food and Agriculture

Federal Food and Agriculture Decontamination and Disposal Roles and Responsibilities

November 2005

USDA Responsibilities: Nuke-RAD Incident Annex to the NRF:

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  - Radiologically c
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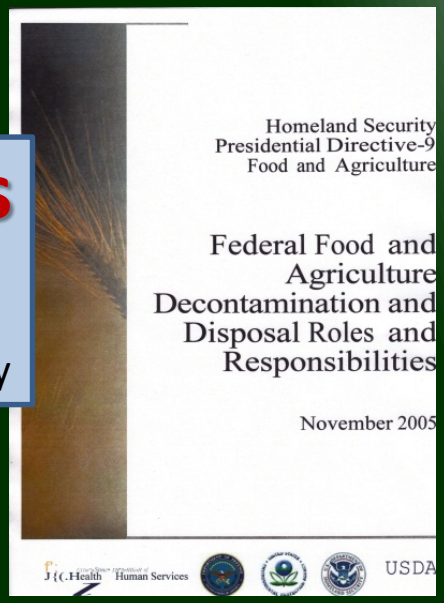
"Radiological events are not addressed"

*Pg. i, paragraph 2, Executive Summary



U.S. Department of Agriculture: Major Radiological Preparedness Challenges:

- Regionalization of release through movement control monitoring and sampling statistically relevant quantity of animals/crops/feeds/foods to assure suitability for consumption
- Radiological monitoring and decontamination for livestock/poultry/pets/zoo animals/wildlife
- Therapeutic countermeasures to mitigate the effects of radionuclide contaminants ingested by animals

U.S. Department of Agriculture: Major Radiological Preparedness Challenges:

- Remediation strategies for soils and crops contaminated by radionuclides
- Livestock euthanasia and disposal of excessively contaminated animals
- Disposal strategies for radiologically contaminated feeds/crops/FSIS regulated products
- Providing support to the agriculture sector affected by a radiation release

U.S. Department of Agriculture: Major Radiological Preparedness Challenges:

- Providing support and personnel as a signatory member of the Advisory Team for Environment, Food, and Health
- Rural Utilities: Reestablishment of Critical Infrastructure
- Agricultural Marketing Service: Wholesomeness of USDA Commodities
- Radiation Safety Staff: Worker Safety
- Food Safety and Inspection Service: Safety of regulated products
- APHIS Veterinary Services, OSIC: Emergency response
- APHIS Animal Care: Pets, zoo and laboratory animals

U.S. Department of Agriculture: Membership in the Advisory Team for Environment, Food, and Health

- A-Team (EPA, CDC, FDA, USDA):
  - Provide coordinated technical advice and recommendations to the State, Coordinating Agency, and DHS concerning environmental, food, and health matters, and participate and provide outreach and guidance for development of, RAD emergency exercises
  - USDA: Provide agricultural subject matter expertise, support, and Protective Action Recommendations to federal, state, local, and tribal radiological emergency responders

U.S. Department of Agriculture Major Response and Recovery Agency Participants

- Other USDA Agencies providing response and recovery services and capabilities
  - Food and Nutrition Service (FNS)
  - Farm Services Agency (FSA)
  - Economic Research Service (ERS)
  - Natural Resources and Conservation Service (NRCS)
  - Agriculture Research Service (ARS)
  - Office of General Council

U.S. Department of Agriculture Major Response and Recovery Agency Participants

- Economic Research Service
  - Protective actions start before confirmation of contamination – embargoes - trade and consumers
  - Reducing the potential for contamination of food and animal feeds
  - Extended impacts on patchwork of ag production systems

U.S. Department of Agriculture Major Response and Recovery Agency Participants

- Economic Research Service
  - Dependent on communication and perceptions
  - Remediation may yield "clean food", but costs rise with the application of practices needed to assure quality
  - International stigma a concern for marketing
  - Other sources replace products in markets

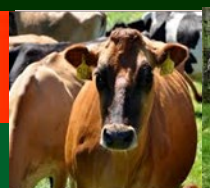
U.S. Department of Agriculture Major Response and Recovery Agency Participants

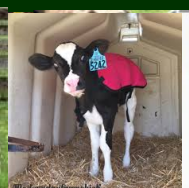
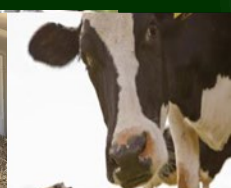
- Farm Services Agency
  - Disaster Assistance
  - Livestock and crop losses; property, equipment damage
  - Commodity, Price Support
  - Protect against market losses
  - Conservation Efforts
  - Farm Loans
  - Start new operation
  - Sustain farming operations

U.S. Department of Agriculture Major Response and Recovery Agency Participants

- Farm Services Agency
  - DIPP
    - Dairy Indemnity Payment Program (DIPP) – provides compensation to dairy producers when directed to remove raw milk from the commercial market due to contamination by nuclear radiation or fallout, toxic substances, etc.

Fact-Sheets- https://www.fsa.usda.gov/news-room/fact-sheets/index



U.S. Department of Agriculture Major Response and Recovery Agency Participants

- The Office of the General Counsel (OGC)
  - determines legal policy and provides legal services in support of all programs and activities of USDA.
  - Headquarters legal staff is divided into 5 divisions: (1) Marketing, Regulatory, and Food Safety Programs; (2) International Affairs, Food Assistance, and Farm and Rural Programs; (3) Natural Resources and Environment; (4) General Law and Research; and (5) Civil Rights, Labor, and Employment Law.

U.S. Department of Agriculture Major Response and Recovery Agency Participants

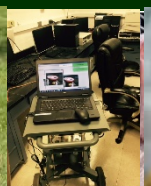
- The Office of the General Counsel (OGC)
  - Field-based staff is organized into 4 regions with 12 offices across the country.
  - OGC participates in FEMA-led Radiological Recovery Seminars and Workshops to provide legal context to the discussions on agricultural recovery, including the scope of USDA authorities.

U.S. Department of Agriculture Emergency Response Resources: ESF #11

- Responsibilities of Emergency Support Function #11 Coordinators: Located at Each FEMA Region
  - Monitoring for and responding to animal/plant pest, disease, and other emergency situations
  - Providing for the safety and well-being of household pets;
  - Offering nutrition assistance
  - Ensuring the safety and security of the Nation's commercially produced meat, poultry, and egg products

U.S. Department of Agriculture Emergency Response Resources: APHIS Radiological Program

- Develop robust and practicable strategies for maintaining agricultural production and a safe food supply following a nuclear or radiological release
  - Surveillance and decontamination strategies for contaminated or irradiated pets, service animals, livestock and wildlife
  - Regionalization strategies to defend the wholesomeness and integrity of the nations agriculture



U.S. Department of Agriculture Emergency Response Resources: APHIS Radiological Program

- Develop robust and practicable strategies, Cont'd
  - Remediation strategies for soils and crops
  - Therapeutic strategies for the development and use of radiation prophylaxes and therapies for animals
  - Euthanasia and carcass disposal strategies for contaminated animals
  - Disposal strategies for contaminated agricultural products

USDA's Response Goal

- The return to sustainable marketability of livestock, poultry, foods, crops, and feeds which have been determined by sampling, monitoring, and geographic location, not to have been contaminated by a radiological release.

- Regionalization of the event to reduce impact on international trade, and enhance domestic consumer confidence

Agricultural Response Priorities

1. Establishing initial movement control zones
   - Revising as science and policy direct
   - Regionalization goal
2. Determining what animals and agricultural products need stop movement/disposal
   - Stop movement: immediate
   - Disposal: delayed
   - Initial emphasis on concentrated operations
   - What about sustenance farms?

Agricultural Response Priorities

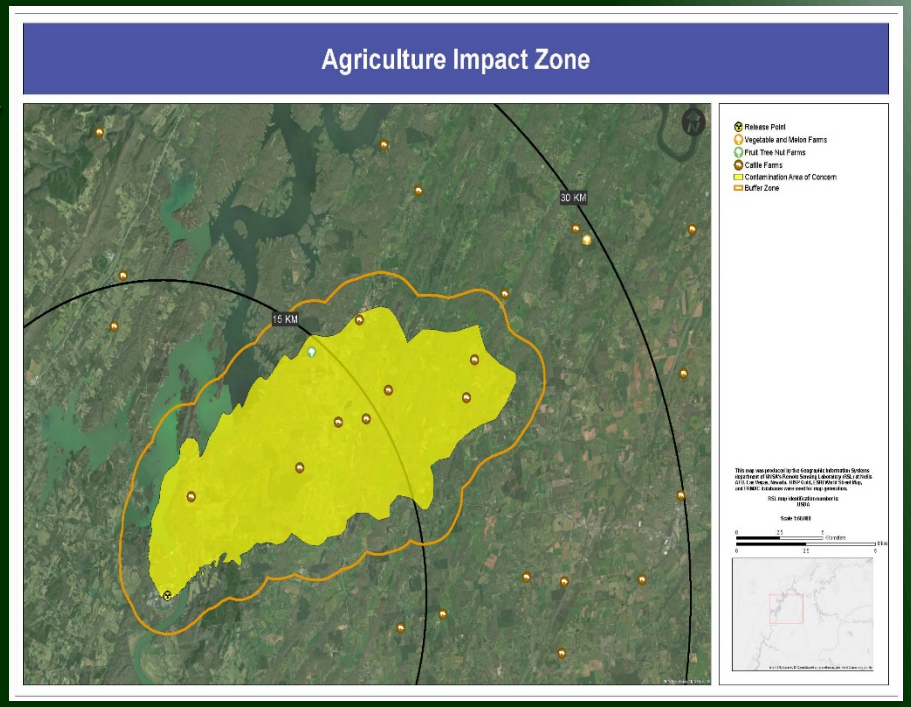
1. Monitoring production facilities outside buffer zone
   - TRACS
   - FERN
   - Establishing statistically appropriate and manageable sample volume
   - Determining whether buffer zone needs expansion/contraction
   - Monitoring animals ante-mortem

Agricultural Recovery Priorities

1. Assuring Food Safety
   - Monitoring
   - Sampling
     - Protocol to assure 95% assurance
     - Timely analysis/product line
   - Regionalization
     - Adequate buffer zone
     - Movement control within that zone
     - Container portal monitors

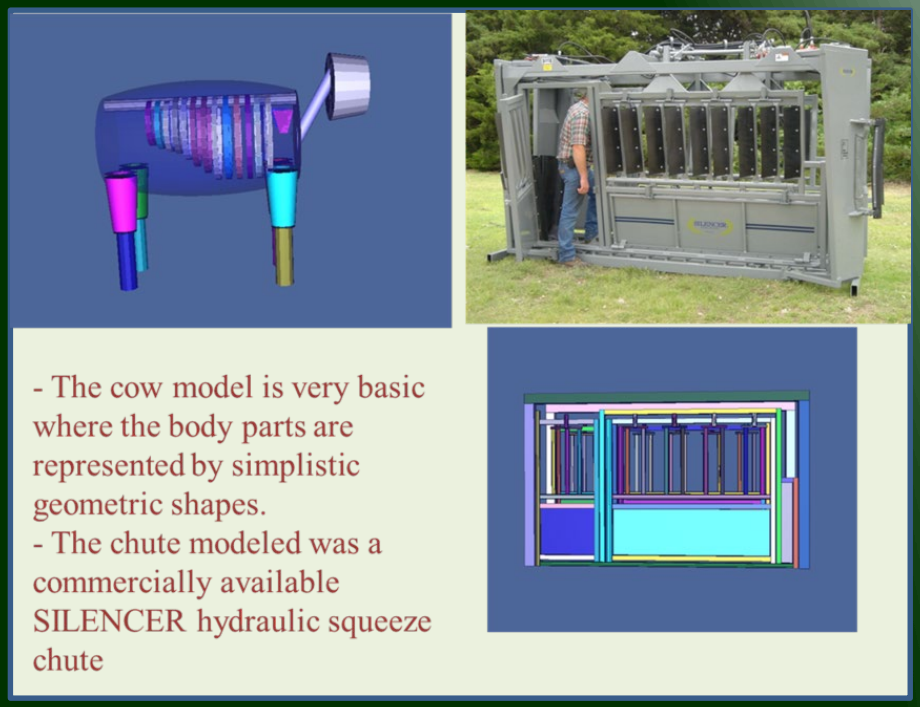
Agricultural Recovery Priorities

1. Regionalization
   - Establishing a buffer zone outside of which there is no increased level of radiation
   - Sampling TRACS/FERN/State labs



Ante-mortem Monitoring of Livestock

- Groundwork already laid through NIFA Grant to Texas A & M University
- Very scientific, very sophisticated, very expensive



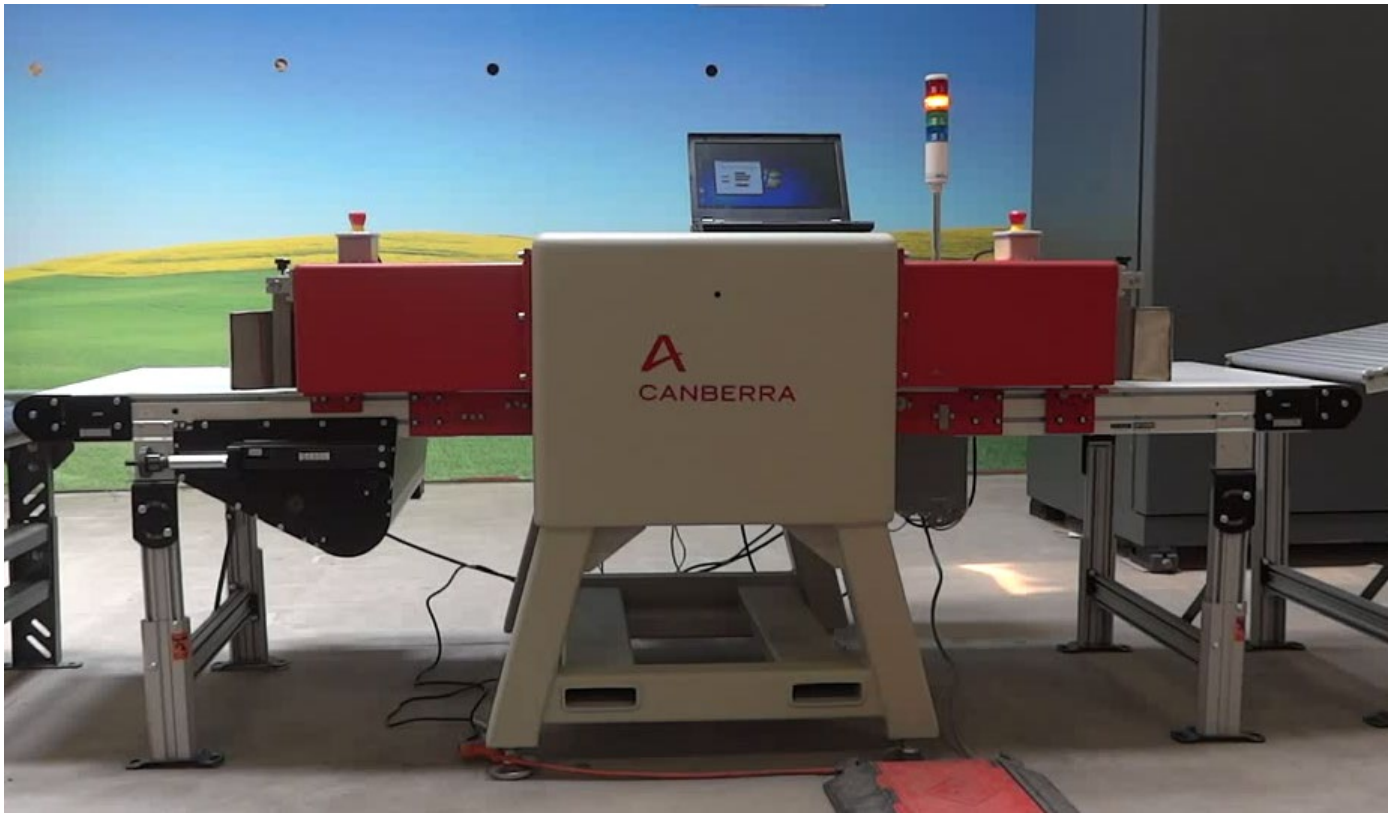
Monitoring of Product Lines

Rice, and other food products

- Fukushima prefecture known for producing high quality rice
- Traditional statistical sampling regimes still allowed some rice above regulatory levels to escape the local embargo area
- Widely reported in press; consumers shunned rice from this area
- Prefecture decreed that 100% of the rice from there would be measured and certified to be clean
- QR sticker to get results
- 5 companies supplied ~150 systems [Canberra 30]
  - Designed, built and delivered in 6-8 months
  - Large NaI detector
  - Full gamma spectroscopy
  - 30 kg rice bags
  - MDA - 10Bq/kg in 10seconds, in 1uSv/hr background field

Monitoring System for Rice Bags

- Samples placed on conveyor section at right side of video
- Conveyor senses presence of item and moves it into the shield
- Counting and analysis time is very short – approximately 10 seconds
- Lights tell operator the status of the operation and the result of each bag
- Multiple bags can be on conveyor at same time
  - Maximizes bags per hour



Is food unsafe?

- An Alaskan university research program on impact of Fukushima radiocesium release on the Alaska tuna fishery

Is Food Unsafe?

- Alaskan university research on impact of Fukushima on tuna fishery
  - Found tiny increase in Cs 137
  - Unable to get funding because of insignificant findings
  - Reported 33% increase in radiocesium in tuna
  - Finding: 3 Bq/Kg over 2 Bq/Kg (FDA DIL: 1,200 Bq/Kg)
  - AK fishery threatened by consumer perception

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  - AK fishery t rception

Actually. A 50% increase.
Bad science, bad math

Is Food Unsafe?

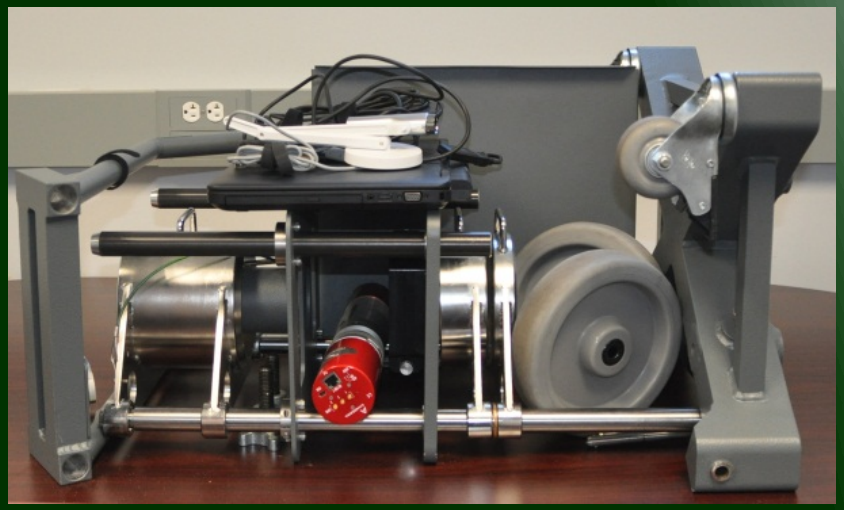
- Perception VS Science: Greatest Impact on Agricultural Recovery
- Example: BSE **Cow that stole Christmas**

FDA Portable Gamma Analysis System

- Design Features:
  - Robust, light weight, modular, scalable, mobile
  - Field user does not need radionuclide expertise
  - User-friendly
  - Limit time and resources required in the field
  - ISO 17025 compliant analytical data
  - Real time in-situ high throughput sample data collections and analytical results

FDA Portable Gamma Analysis System

- Portability
  - The unit weighs ~110 lbs. fully assembled.
  - The system can be disassembled and assembled in less than ten minutes.
  - Can be stored in a car trunk



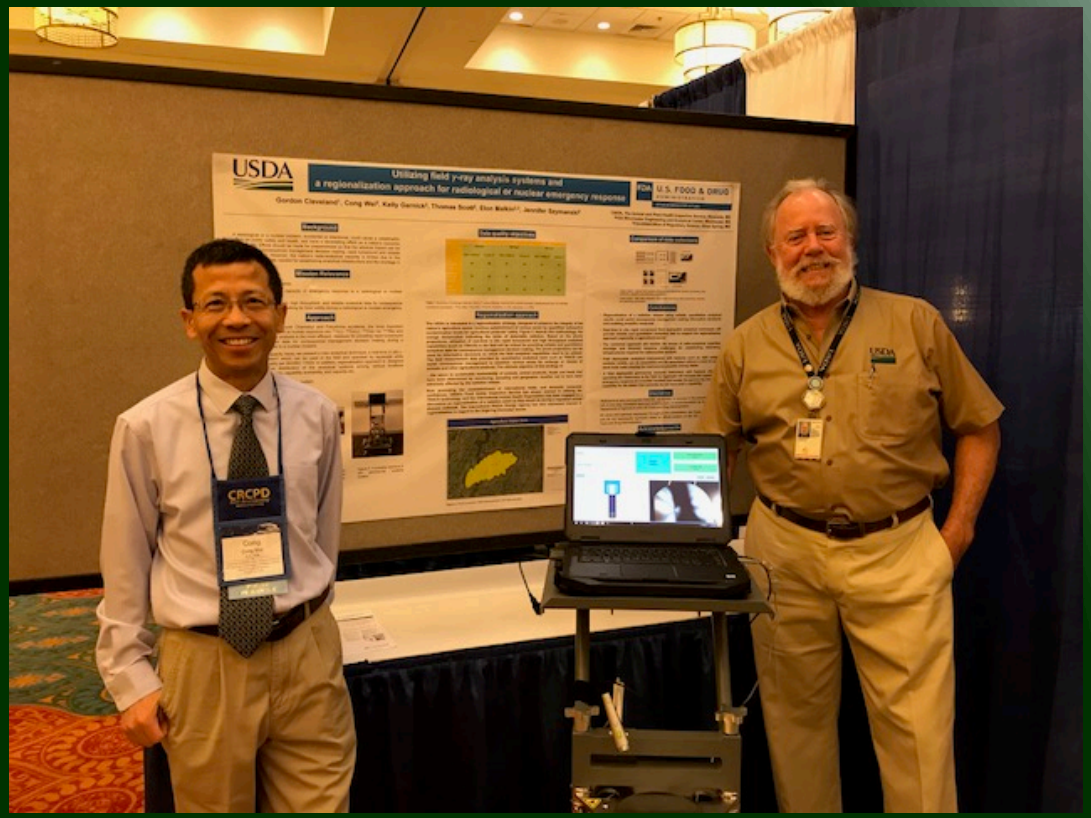
FDA Portable Gamma Analysis System

- Portability
  - The temperature stabilized Cerium Bromide detector provides robust measurement capabilities without the need for cooling.
  - The unit is battery powered by the laptop PC's USB port
  - Self-calibrating algorythm

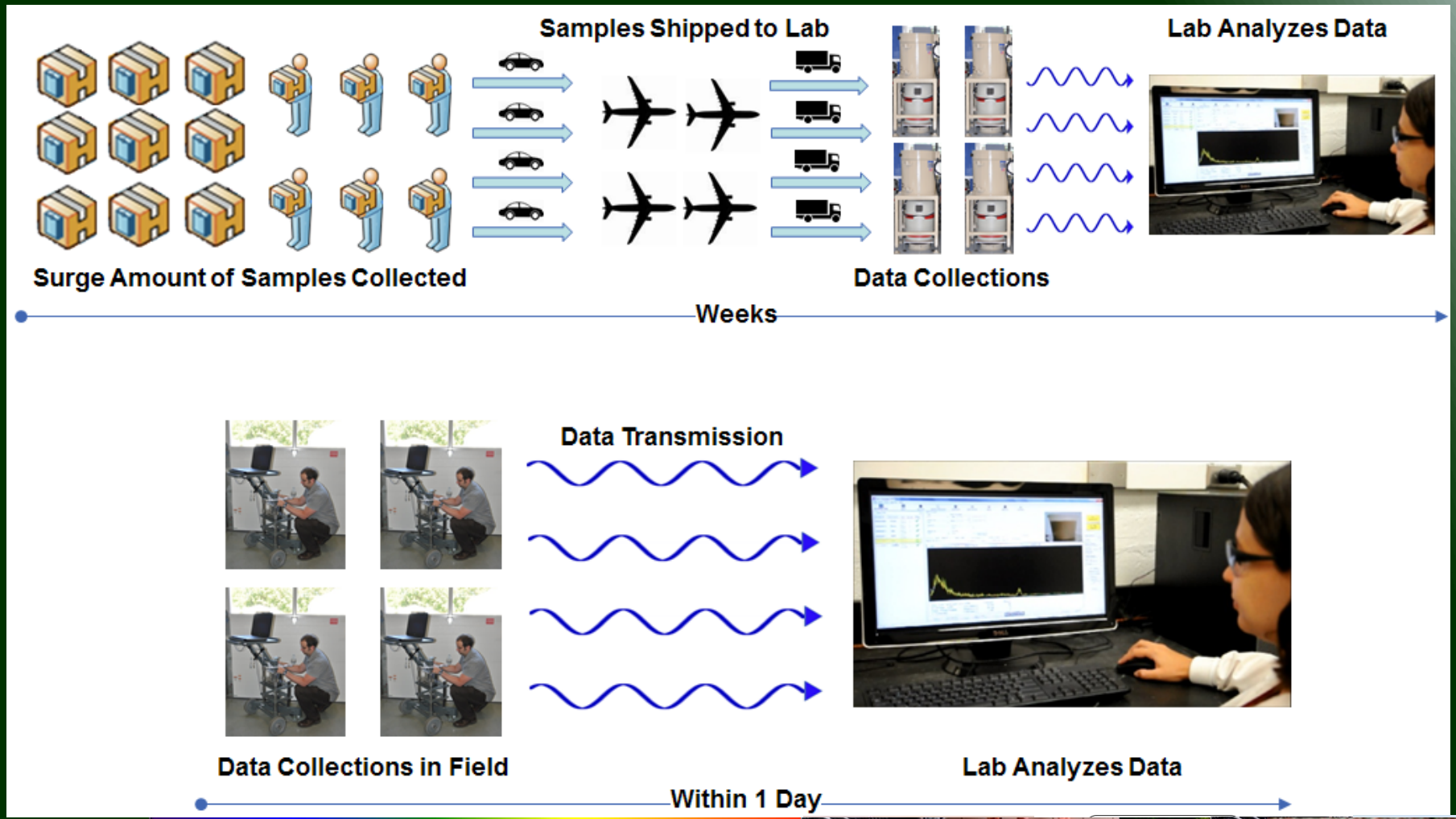
FDA Portable Gamma Analysis System

TRACS unit (R2D3) regionalization poster presentation at Conference of Radiation Control Program Directors

State HHS buy-in critical to state regionalization strategy



Comparison of Data Collection



FDA Transportable Radiation Analysis Counting System

- Grant Opportunity for States, Academia, etc. to Acquire TRACS
  - FDA Office of Regulatory Affairs, Center for Veterinary Medicines and Center for Food Safety and Applied Nutrition, Laboratory Flexible Funding Model (LFFM) (U 19)
  - Announced February 5th, closes April 6th 2020
  - https://grants.nih.gov/grants/guide/pa-files/PAR-20-105.html

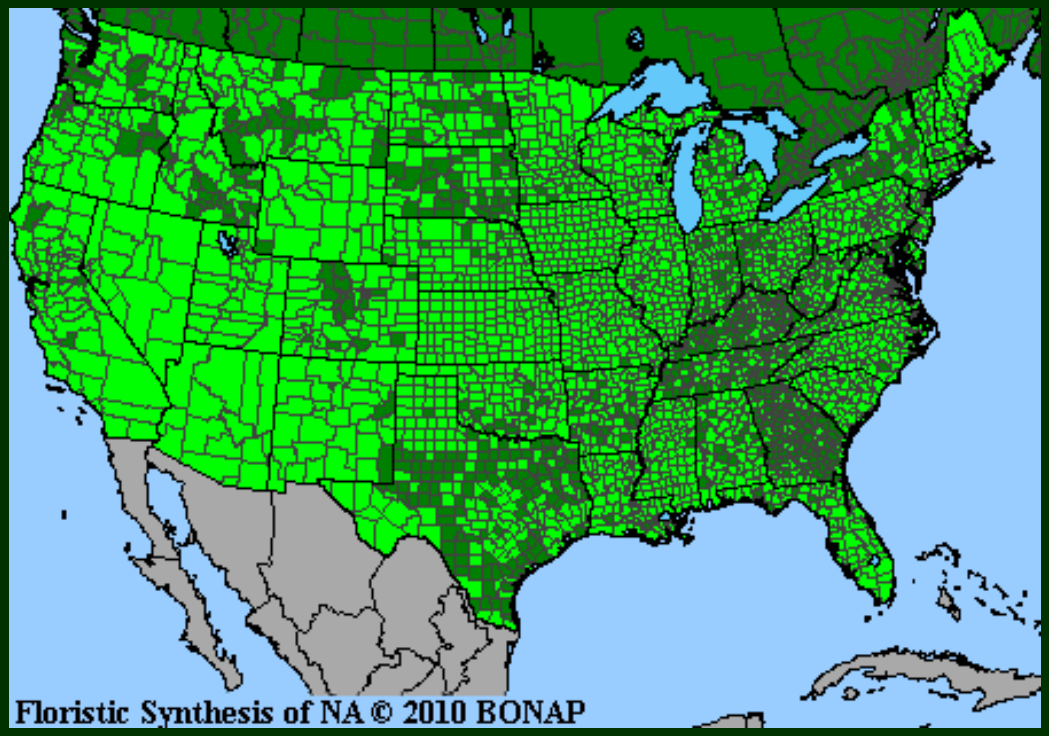
Major Challenges: Radiocesium

- Mitigation of contaminated soils
- Mitigation of contaminated concrete surfaces
- Ante-mortem monitoring of livestock
- Monitoring of product lines
- Internal/external animal decontamination
- Carcass disposal

Mitigation of Contaminated Soils: Horseweed *(Conyza canadensis)*

- Anecdotal genesis
- FEDs: Stovepiped research
- Academic rescue
- Preliminary findings
- Research proposal
- Predicted deliverables
- Further development

Mitigation of Contaminated Soils: Horseweed *(Conyza canadensis)*



Color Key :

Present and Native

Present and Common

Mitigation of Contaminated Soils: Horseweed *(Conyza canadensis)*

MERITS:

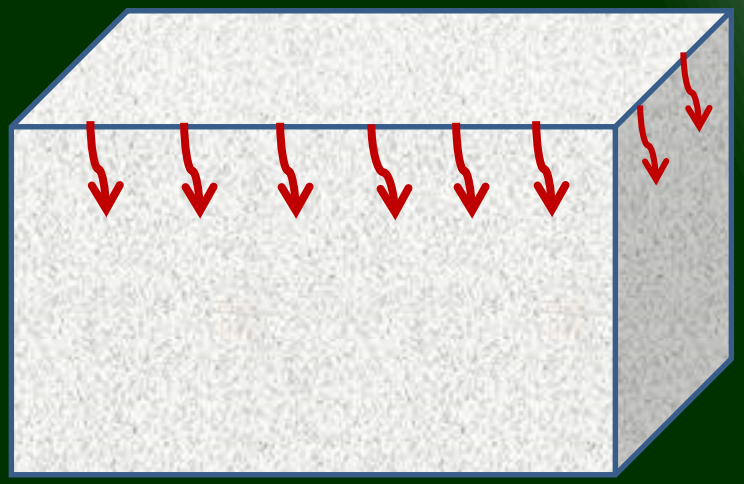
- Ubiquitous
- Roundup (herbicide) Tolerant
- Rooted in soil sequester zone (5 cm: Fukushima)
- High uptake potential

Mitigation of Contaminated Soils: Horseweed *(Conyza canadensis)*

"Horseweed's (*Conyza canadensis*) efficiency to remove cesium and strontium from a solution was determined. When incubated in a solution spiked with cesium, *Conyza canadensis* plants removed 89.6% of the cesium at the end of 168 hours. Overall, the data suggests that *Conyza canadensis*, commonly known as horseweed, shows promise as bioremediator of radiocesium."

Retrieval of Radiocesium Bound in Concrete

- Cs migrates several millimeters and is chemically bound in concrete
- Studies indicate fungus can retrieve chemically bound Cs (Norway/Fukushima)



Retrieval of Radiocesium Bound in Concrete

Fungi accumulate radionuclides from the environment by:

- Physico-chemical mechanisms
- Immobilization
- Precipitation
- Sequestration
- Compartmentalization

Boletus edulis

Retrieval of Radiocesium Bound in Concrete

Combination of decontaminating film technologies with a fungal agent may lead to:

- Retrieval of radiocesium sequestered in concrete
- Removal of film from substrate by chemical or physical means
- Disposal in appropriate manner by HAZMAT teams

Retrieval of Radiocesium [illegible] in Concrete

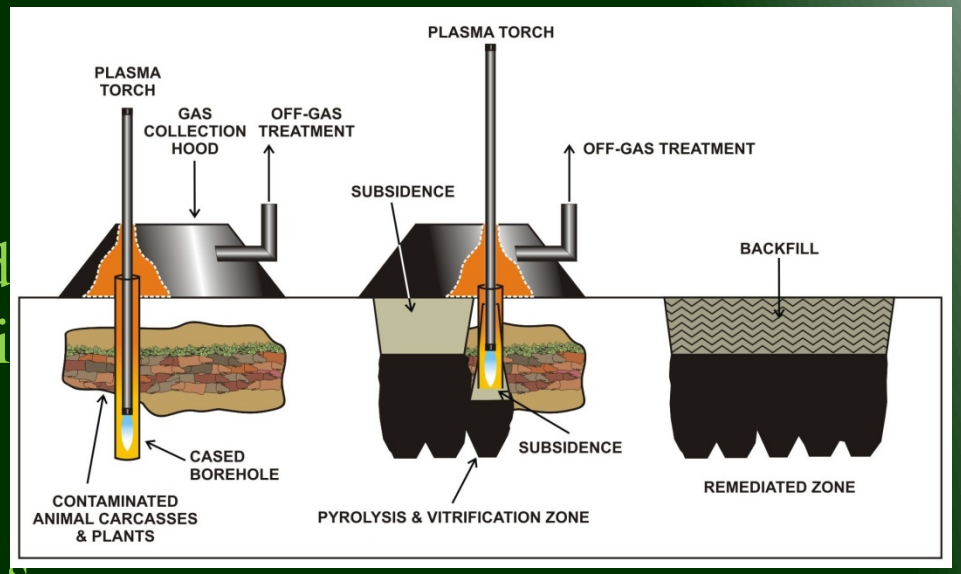
Combination of decon[illegible]ing film technologies with a[illegible] agent may lead to:

- Retrieval of ra[illegible]um sequestered in concrete
- Remov[illegible] from substrate by che[illegible] physical means
- Di[illegible]n appropriate manner by HAZMAT teams

Funded by EPA FY 2017

Carcass and Agricultural Product Disposal

- Disposal of excessively contaminated animals feeds/crops/FSIS regulated products
- Federal, State, academia and private sector collaboration i the development of in situ plasma arc vitrification of Highly contaminated animals and agricultural products



USDA Agency Contacts

- Economic Research Service – www.ers.usda.gov
- National Agricultural Statistics Service – www.nass.usda.gov
- Census of Agriculture – www.agcensus.usda.gov
- Foreign Agricultural Service – www.fas.usda.gov
- Agricultural Marketing Service – www.ams.usda.gov
- FSA USDA Service Centers - offices.usda.gov

  https://www.fsa.usda.gov/news-room/fact-sheets/index
- Office of General council: https://www.usda.gov/our-agency/staff-offices/office-general-counsel-ogc
- Advisory Team for Environment, Food, and Health:

  https://cdn.ymaws.com/www.crcpd.org/resource/resmgr/ATeam/Ateam.htm
- Natural Resources Conservation Service, Web Soil Tool: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Oh, crap! Was that TODAY?
REGAN

QUESTIONS?

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Office: **(301) 851-3597**