



## ***Nevada Site Specific Advisory Board (NSSAB)***

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### **Full Board Meeting**

**Tonopah Convention Center  
301 Brougner Avenue, Tonopah, NV  
5:00 p.m. – July 20, 2016**

**Members Present:** Amina Anderson, Michael Anderson, Michael D'Alessio, Pennie Edmond, Donna Hruska (Chair), Janice Keiserman (Vice-Chair), Donald Neill, Steve Rosenbaum, Edward Rosemark

**Members Absent:** Michael Moore, William Sears, Cecilia Flores Snyder, Jack Sypolt, Francisca Vega

**Liaisons Present:** Christine Andres (State of Nevada Division of Environmental Protection [NDEP]), Phil Klevorick (Clark County), Vance Payne, Nye County Emergency Management (NCEM), Jonathan Penman-Brotzman (U.S. National Park Service [NPS])

**Liaisons Absent:** Richard Arnold (Consolidated Group of Tribes and Organizations [CGTO]), John Klenke (Nye County Nuclear Waste Repository Project Office [NWRPO]), Frank Carbone (Nye County Commission), Ralph Keyes (Esmeralda County Commission)

**Department of Energy (DOE):** Robert Boehlecke, Tiffany Lantow, Kelly Snyder (Deputy Designated Federal Officer DDFO)

**Navarro (Contractor):** Irene Farnham

**Desert Research Institute (DRI):**  
**-Contractor:** Dr. Vic Etymezian, Julie Miller, Chuck Russell

**National Security Technologies (NSTec) – Contractor:** Scott Kranker

**Facilitator:** Barb Ulmer (Navarro)

**Public Signed In:** Ed Mels (Canberra)

## **Open Meeting/Chair's Opening Remarks**

Chair Donna Hruska opened the meeting by thanking the Board and staff for attending the meeting in Tonopah, Nevada. She also thanked the town of Tonopah for its hospitality and encouraged members of the public to provide input during the public comment period or by visiting with Board members and liaisons individually during the breaks. Chair Hruska announced that Thomas Seley resigned as he recently returned to federal service with the Bureau of Land Management, and he cannot serve on the NSSAB while employed as a federal employee. Vice-Chair Janice Keiserman moved to approve the agenda as presented. The motion was seconded and passed unanimously.

## **Public Comment**

There was no public comment.

## **U.S. DOE Update** *(Robert Boehlecke, DOE)*

Mr. Robert Boehlecke explained the DOE is revising the Nevada National Security Site (NNSS) Waste Acceptance Criteria (WAC), the document utilized by generators to determine the performance criteria for transporting and disposing waste at the NNSS. The revision is to make the document consistent with new U.S. Department of Transportation (DOT) regulations as well as including safety process improvements for the operations team at the Area 5 Radioactive Waste Management Complex (RWMC). There are no substantive changes being made in the revision. The Nevada Field Office (NFO) is currently in dialogue with NDEP on the proposed revisions and anticipate the document to be finalized in late September 2016. Mr. Scott Wade, Assistant Manager for Environmental Management (EM), will be briefing stakeholders at intergovernmental meetings and the next Low-Level Waste (LLW) Stakeholders' Forum, and he offered to brief the NSSAB. After discussion, the NSSAB requested an update on changes to the NNSS WAC at its September 21, 2016 Full Board meeting.

Mr. Boehlecke continued that the NFO has begun the process of applying for a new mixed LLW (MLLW) cell permit with NDEP. A contractor has been hired who is currently working on the design. Construction on the new MLLW cell cannot begin until the permit has been approved. The approval is a multi-step process that includes two public comment periods. The current MLLW cell is expected to reach capacity in early 2018. The NSSAB provided a recommendation to DOE supporting the construction of a new MLLW cell in January 2015.

Mr. Boehlecke reported that the NFO is working with the State of Nevada/Secretary of Energy Working Group to plan for the safe transport for sealed sources waste streams to the NNSS. Sealed sources contain radioactive material within an outer covering. The Office of Off-Site Recovery has been directed by Congress to recover excess unwanted, abandoned, or orphaned radioactive sealed sources that may pose a risk to health and public safety or national security. These sealed sources originate in various industries, i.e. medicine, agriculture, transportation. DOE and the National Nuclear Security Administration are supporting efforts to reduce the future need to dispose of sealed sources, such as exploring commercial disposal and replacement of sealed sources with new technologies.

Mr. Boehlecke stated that DOE continues to work on updating DOE Order 435.1 that addresses the management of radioactive waste within the DOE complex. The latest update is that DOE Order 435.1 will likely not be acted upon until after the new administration has taken office.

Mr. Boehlecke noted that the National Academy of Science will be holding a fall workshop, and one of the items to be reviewed is the definition and classification of LLW.

Mr. Boehlecke highlighted that NDEP's approval of the Frenchman Flat Closure Report is a landmark achievement as it is the first Underground Test Area (UGTA) Corrective Action Unit (CAU) to achieve closure after almost 25 years of EM cleanup efforts. It is important as it paves the path for subsequent UGTA CAUs to go to closure over the next few years.

Lastly, Mr. Boehlecke noted that CAU 411 Double Tracks Plutonium Dispersion reached a major milestone in that it was the first plutonium dispersion site on the Nevada Test and Training Range (NTTR) to go to closure. The NFO Soils Activity has been working with NDEP and the U.S. Air Force (USAF) over the last four years to reach this milestone. The USAF has provided to DOE a final letter on the closure and DOE has requested clarifications. NDEP will be the last to sign off on the process with a notice of completion and the CAU will then be in closure.

In response to Board questions, Mr. Boehlecke provided the following clarifications:

- The origin of the sealed sources comes from various industries and will be processed through the Office of Off-Site Recovery Program, but none originates from NNSS operations.
- The volume of sealed sources is estimated at 5,000 cubic feet over five years. In context, the NNSS receives approximately 1.3 million cubic feet per year; therefore sealed sources is a small percentage of the total volume.
- An internal decision to hire a subcontractor to design and construct the new MLLW cell was based on a number of reasons, including expertise and the availability of personnel.
- Based on the current schedule for the new MLLW cell, the design process will continue until the end of the year. NFO plans to submit the permit to NDEP in the November/December 2016 timeframe. A public meeting to accept public comment, hosted by the NFO, will be scheduled in the November/December 2016 timeframe. Any public comments received will be shared with NDEP. NDEP will then host a public meeting upon request. Upon approval of the permit by NDEP, construction is planned to begin in spring/summer 2017.
- Barring any unforeseen occurrences, funding is in place for the approval process of the new MLLW cell in fiscal year 2017.
- The NNSS does have temporary storage available for MLLW if the current cell is filled to capacity before the new cell is operational.

## **Liaison Updates**

### **Clark County (*Phil Klevorick*)**

Liaison Phil Klevorick observed the DOE-sponsored Public Involvement Officer (PIO) tabletop exercise held on June 2, 2016. The tabletop was focused mainly on the PIOs and the interactions between the regional jurisdictions in response to a potential radiological event. Liaison Klevorick noted that the tabletop was well attended and received by the PIOs. Liaison Klevorick attended the National Transportation Stakeholders Forum (NTSF) in June 2016. The focus of the NTSF is high-level waste, although he explained that there are parallels and an overlap of transportation

needs across the country. Tribal, federal, and state jurisdictions were in attendance. Liaison Klevorick encouraged the NSSAB to continue to attend these focused meetings as it is valuable to have a big picture understanding of the issues.

**NCEM** (*Vance Payne*)

Liaison Vance Payne reiterated that DOE planned and executed a successful tabletop exercise for PIOs. It is valuable training in the development of a PIO and should be an ongoing effort to include future succession training. Liaison Payne reported that a Technical Advisory Group (TAG) has been formed to study the U.S. Ecology event that occurred in October 2015. The TAG will have representation from many disciplines, including the State of Nevada and Nye County. DRI has been hired to take the lead on behalf of the State of Nevada. Liaison Payne will keep the Board apprised on the TAG efforts and conclusions. Liaison Payne stated that Tonopah is the home base for one of five volunteer ambulance services in Nye County other than Pahrump, Nevada. His office will be developing a response model that will include fire, emergency management services, hazardous materials, and radiological response. He recommended that the Board review the plans that the Nevada DOT has regarding the Interstate-11 corridor at [http://www.nevadadot.com/Projects\\_and\\_Programs/Road\\_Projects/Current\\_Projects.aspx](http://www.nevadadot.com/Projects_and_Programs/Road_Projects/Current_Projects.aspx)

**NDEP** (*Christine Andres*)

Liaison Christine Andres noted that Mr. Boehlecke touched on a number of items that NDEP is currently involved in his DOE update. She mentioned that she will be representing NDEP at the DOE Groundwater Open House in Amargosa Valley, Nevada on July 26, 2016. Liaison Andres stated that DOE submitted the Frenchman Flat Closure Report, and NDEP has approved as the final. To supplement what Liaison Payne touched on regarding succession training, NDEP is discussing methods of documenting its institutional knowledge to record the EM cleanup decision-making process for future reference.

**NPS** (*Jonathan Penman-Brotzman*)

Liaison Jonathan Penman-Brotzman mirrored what previous liaisons had mentioned regarding the issues of an aging workforce and the importance of training for PIOs. As a former PIO for the NPS, he noted that the duties of a PIO is an art and a science and an important part of an agency, although he has seen a significant decrease in the number of PIOs in the workforce since 9/11. Liaison Penman-Brotzman stated that the NPS is involved as an NSSAB liaison, because the NPS has an interest in the groundwater discharges from the NNSS since the flow models end at Furnace Creek and are in the pathway for Devils Hole. Also of concern to the NPS, the regional transportation corridor for LLW travels along the boundaries of Death Valley National Park (DVNP). He concluded by stating that Tonopah is considered a gateway to DVNP and hopes to partner with the town in the future.

**Air Monitoring Stations at the Tonopah Test Range – Work Plan Item #4** (*Tiffany Lantow, DOE and Dr. Vic Etyemezian and Julie Miller, DRI*)

- **NSSAB Work Plan Item #4**
  - The NSSAB will provide a recommendation, from a community perspective, on whether air monitoring stations on the Tonopah Test Range (TTR) should be moved to different locations, maintained at the current locations, or the sampling approach modified
- **Presentation Outline**
  - What is the TTR?
  - Why is air being monitored and samples collected?

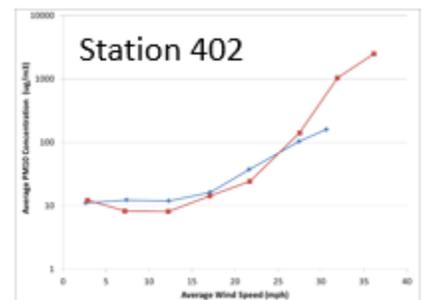
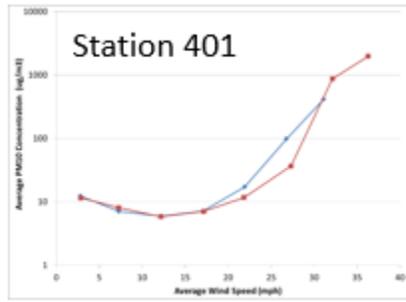
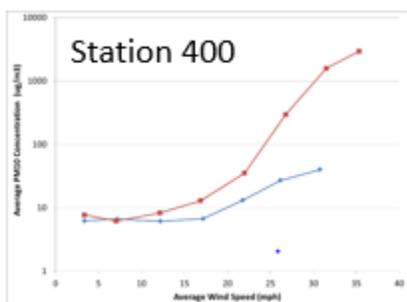
- What is being monitored?
- Where are the monitoring stations?
- What are the monitoring results?
- **TTR**
  - Secure and remote location
  - Broad, flat valley provides long flight corridor
  - Operations managed by Sandia for the National Nuclear Security Administration
  - Testing range for weapon components and delivery systems
  - Nevada Field Office has environmental management responsibilities for several sites on the TTR
    - Sandia and U.S. Air Force do not conduct operations within fenced areas of these environmental sites
- **Air Monitoring Sites Background**
  - Clean Slate I, II, and III are the sites of plutonium dispersal tests conducted in 1963
  - Detonation of high explosives on a variety of surface structures with various combinations of weapon material [plutonium (Pu), americium (Am), and uranium (U)]
  - Plutonium dispersed over large areas (total 890 acres based on aerial surveys)
    - Radionuclides dispersed in plumes southeast from detonation points
  - Although some cleanup activities have occurred, contaminants remain in place
- **Clean Slate I Test Photos, May 25, 1963**
- **Status of Sites**
  - Post-test debris gathered into soil mounds and soil from detonation areas scraped into mounds, all covered by other soil
  - Fences constructed around contaminated areas
  - Clean Slate I remediated through removal of debris, mounded soil, and highly contaminated soil in the 1990s
  - Clean Slate II and III have not undergone the same remediation and higher levels of contamination are present
- **Purpose of Current Air Monitoring**
  - Evaluate whether there is wind transport of radiological contaminants from the Clean Slate sites
    - If transport is observed, determine under what conditions it occurs and its magnitude
  - Characterize airborne radiological conditions at the Range Operations Center, near the location of most TTR workers
  - Provide data for Sandia TTR annual site environmental monitoring report
  - Support development of closure and long-term stewardship strategies
- **Monitoring Focus**
  - Movement of soil particles by wind and the factors that control it
    - Meteorological conditions
    - Site properties (soil conditions, local topography, and vegetation cover)
  - Radiological conditions
- **Saltation and Suspension**
  - Saltation (sand ballistic impacts on soil) is primary means of emitting dust
  - Amount of sand carried across a line should relate to amount of dust emitted from surface
- **Mechanisms of Windblown Transport**
  - Creep
    - 0.2 – 2 millimeter (mm) particles roll due to pressure differential
  - Saltation

- 0.04 – 0.4 mm particles suspended, travel parallel to ground from 1-5 meters (3.3 – 16.4 feet), then re-impact
    - Cause release of additional particles
  - Emission/Suspension
    - 0.001 – 0.03 mm particles (“dust”) suspended and transported between 10 – 10,000 meters (32.8 feet – 6.2 miles)
- **Air Sampler**
  - Collects suspended dust particles onto filter
    - Operates continuously
    - Timing of when particles are collected cannot be known accurately
    - Collected airborne particulates can be analyzed for radionuclide content
- **Saltation\* Sensors**
  - Piezo-electric impact sensor\*\*
    - Measures impacts of sand grains above detectable threshold for size and speed
    - Provides means to track sand movement in response to specific wind conditions

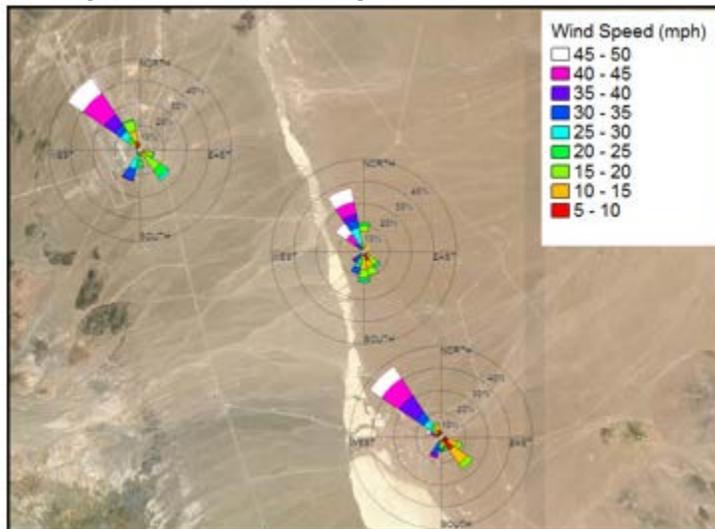
\*Saltation: hop along the ground under action of the wind  
 \*\*Sensit Inc., Redlands, CA
- **Sand Traps**
  - Wedge-shaped trap
    - Collects sand particles that saltate into opening
    - Timing of when sand grains are collected cannot be known accurately
    - Collected sediment can be analyzed for radionuclide content
- **Monitoring Station Locations**
  - Three portable stations (trailer mounted or partially trailer mounted)
  - Locations chosen based on wind direction, access, power availability
    - Wind data for the Tonopah Airport used initially and identified northwest and south-southeast as predominant directions (substantiated by later station measurements)
- **Station Facts\***
  - Stations 400
    - Range Operations Center is closest regularly manned work area
    - 5-6 miles from Clean Slate sites
    - No saltation sensors or sand traps
    - Operating since 2008
  - Stations 401
    - Closest to main work force
    - Along northwest perimeter of Clean Slate III fence
    - Includes saltation sensor and sand traps
    - Operating since 2008
  - Stations 402
    - Closest to military training operations
    - Along northwest perimeter of Clean Slate I fence
    - Includes saltation sensor and sand traps
    - Operating since 2011

\*All stations are northwest of sites, downwind during south-southeast winds
- **Monitoring Results**
  - Tracked local wind patterns and speed
  - Observed soil particle movement
    - Saltation
    - Suspension

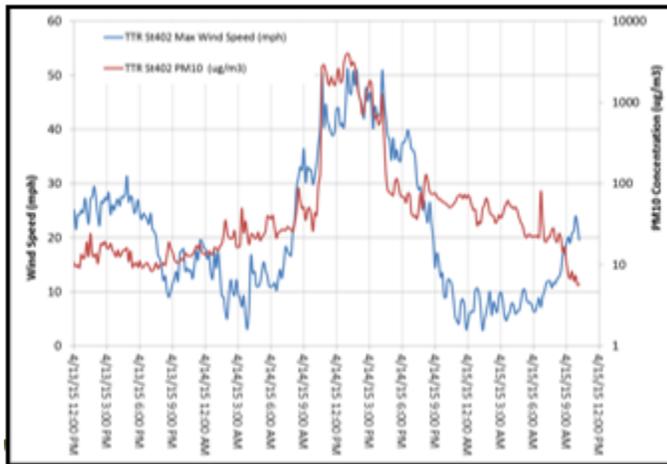
- Radiologic measurements of airborne particulates and saltating material
  - Gamma radiation
- **Observed Sand Saltation**
  - Data from piezo-electric impact sensors
  - Nonlinear relationship between wind speed and saltation
  - Threshold of about 15-20 mph for onset of saltation
- **Dust Suspension – Wind Speed and Particulate Matter (PM<sub>10</sub>)**
  - PM<sub>10</sub> (particles smaller than 10 micrometers in diameter) are of health concerns as they are inhaled into deepest part of lung
  - PM<sub>10</sub> is estimated from particle size profiler data (optical measurement)
  - Threshold of about 15-20 mph for onset of dust emission
- **Suspension – Wind Direction Red – Northwest; Blue – South**



- **Example Wind Event: April 15, 2016**



- **Station 402 Maximum Wind Speed and PM<sub>10</sub> Concentration in Air (April 15, 2015)**



- **Saltation & Suspension: Findings Recap**

- Localized sand movement occurs under the influence of high wind
- Sand trap data indicate:
  - Dust transport is bi-directional depending on wind direction, with northerly winds apparently causing greater transport\*
    - \*Current monitoring focuses on capturing sand transporting off Clean Slates I and III under south-southeasterly winds
- Sand transport can be highly variable from year to year due to:
  - Wind strength and direction distributions
  - Changes in vegetation cover
  - Influx of sand from annually variable alluvial processes (transported by precipitation runoff)
- Suspended dust is enhanced during high winds, but the source area is unclear
- Suspended dust at high winds is observed under both main wind direction regimes

- **Radiologic Measurements: Findings**

- Gross alpha and gross beta counts on filter samples are consistent with other samples from regional sites
- Gamma rate measurements in-situ are slightly higher than pressurized ion chamber (PIC) measurements elsewhere, probably as a result of location and geology
  - Periodic spikes occur during precipitation events
- Gamma spectrometry has only detected natural radionuclides (other than during Fukushima); alpha spectroscopy not performed
- Plutonium and americium above background levels detected by alpha spectroscopy of material captured in saltation traps

- **Radiologic Measurements**

- Particulate sampling of suspended dust:
  - Filters capture particulates from continuous flow, low-volume air samplers that intake air at about the same height as a standing person
  - Gross alpha and gross beta results are comparable to similar samples collected elsewhere in Nevada
  - Gamma spectroscopy has identified only naturally occurring radionuclides except in 2011 when cesium-134 and -137 from Fukushima detected
- Gamma exposure rate monitoring:
  - Gamma energy is continuously measured using a PIC

- Mean gamma exposure rate is slightly higher than PIC measurements elsewhere in Nevada; could reflect altitude, latitude, geology
- Spikes in gamma rate tend to coincide with rainfall, which washes out naturally occurring radioactive particles in the atmosphere
- Samples of saltating particles collected by traps:
  - Alpha spectroscopy analysis of  $^{238}\text{Pu}$ ,  $^{239+240}\text{Pu}$ , and  $^{241}\text{Am}$
  - *Generally* higher concentrations on smaller particles
- Concentrations are:
  - Higher than background, which is about 0.02 picocuries per gram (pCi/g) for  $^{239+240}\text{Pu}$
  - Lower than the 25 millirem per year action level, which for  $^{239+240}\text{Pu}$  is 4,750 pCi/g
- **Radiologic Measurements: Findings Recap**
  - Gross alpha and gross beta counts on filter samples are consistent with other samples from regional sites
  - Gamma rate measurements in-situ are slightly higher than PIC measurements elsewhere, probably as a result of location and geology
    - Periodic spikes occur during precipitation events
  - Gamma spectrometry has only detected natural radionuclides (other than during Fukushima); alpha spectroscopy not performed
  - Plutonium and americium above background levels detected by alpha spectroscopy of material captured in saltation traps
- **Monitoring Conclusions**
  - Migration of contaminated soil from Clean Slate I and III has not been detected in air filters and PICs
  - Movement of plutonium and americium exceeding background concentrations is observed in saltation traps at concentrations at ~ 4 percent of action level
  - Saltation and suspension of PM<sub>10</sub> size particles I observed for wind speeds exceeding 15-20 mph
  - Winds in excess of 20 mph occur less than 2% of the time (about 170 hours in 2015)
  - Highest winds are from the northwest, but the stations are downwind for south-southwest winds so samples are not collected from the strongest wind direction
- **NSSAB Path Forward**
  - The NSSAB will provide a recommendation, from a community perspective, on whether air monitoring stations on the Tonopah Test Range (TTR) should be moved to different locations, maintained at the current locations, or the sampling approach modified

In response to Board questions, the following clarifications were provided:

- Even though the most predominant winds are from the northwest, the monitoring stations were located north of the contamination areas (CA) because of the concern with southerly winds blowing across CAs toward the nearest work force.
- Meteorological instruments are able to detect dust devils by the shifting of the winds, although there has not been an elevated contamination reading recorded from a dust devil.
- There is an active airfield several miles from the nearest CA, and personnel are working in the area; this resulted in one of the monitoring stations (Station 400) being located in the vicinity.
- In suspended dust, there has not been any non-naturally occurring radioactivity on the filter samples or the PIC. With saltation, plutonium and americium have been detected in small amounts just above background but well below action levels.

- Based on the data collected to date from the three monitoring stations, the environment is safe for personnel working in the vicinity.
- The air monitoring stations would be physically moved if the decision was made to relocate a station to another location.
- The wind conditions vary greatly from year to year; so generally it is better to maintain a longer record of monitoring data at a specific location.
- With limited funding available, the decision was made not to place an air monitoring station at Clean Slate II as the thought at the time was that the station at Clean Slate III would capture any potential contaminant movement.
- Clean Slate II and III are very similar un-remediated sites that are going to be characterized in the near future for eventual closure.
- DOE has asked DRI to review the current air monitoring stations and provide recommendations on the sampling approach for next fiscal year, and the NSSAB is also being asked for their recommendations as part of this process.
- There is monitoring data from the stations that indicate that the background levels are consistent in both low and higher precipitation years.
- If any changes are made to the sampling approach, DOE would coordinate with any involved stakeholders, such as Sandia and the USAF.
- DOE would be fiscally responsible for any changes to the sampling approach. A new air monitoring station setup would cost about \$60,000, and the annual maintenance for each station is \$73,000 per year.
- The demarcation program monitors all contamination sites on the NTTR and the NNSS to ensure fences are positioned adequately. In the 1960s, the soil mounded over the sites as a cover is not monitored as a control. The Soils Activity is currently addressing Clean Slate II and Clean Slate III to characterize and decide on corrective actions for closure.
- There have not been any revegetation efforts at these sites; although the vegetation within the fences are taller and a higher density than the vegetation outside the fences as the horses are unable to eat the vegetation within the fences.
- The elevation of these sites is around 5,500 feet above sea level.
- Neither Sandia nor the USAF has air monitoring stations in the area. The data from the DOE air monitoring stations are provided to the USAF and to Sandia for the annual site environmental report.
- If additional stations were added to the sampling approach, DOE would not receive an increase in funding, but would be operated within DOE's annual budget.
- DOE staff that work within the fenced areas are required to wear a dosimeter. Since it is USAF-controlled land, the USAF makes the specific decisions on the requirements for dosimeters for its personnel.
- The strongest wind events come both from the northwest and southerly directions and are most common in the spring.

After Board questions and extensive discussion, Member Steve Rosenbaum moved to approve a letter going forward to the DOE with NSSAB recommendations, as follows:

The DOE should consider the possible alternatives for the sampling approach for the air monitoring stations located at the TTR:

- Close Station 402 at Clean Slate I as the site has been remediated and is nearing closure
- Leave Station 400 in current location as it is closest to current work forces
- Add or move a monitoring station to collect data for northerly wind flows

- Add a station south of current monitoring stations as there are military field operations conducted in the Antelope Dry Lake
- Add or move station(s) at Clean Slate II and Clean Slate III at both ends of the plume as they are both un-remediated sites
- Coordinate any changes in the air monitoring stations resulting from this recommendation with the USAF

The motion was seconded and passed unanimously.

**Assessing Potential Exposure to the Public from LLW Truck Transportation to the NNSS – Work Plan Item #9** (*Julianne Miller, DRI*)

- **NSSAB Work Plan Item #9**
  - The NSSAB will provide a recommendation, from a community perspective, on how waste transportation could be improved by DOE
- **Addressing Stakeholder Concerns**
  - What is the “radiation exposure” risk from a truck transporting LLW?
    - Cumulative exposure for gamma radiation and alpha/beta emissions (mostly shielded by walls of trucks and containers)
  - Risk of accidents on public highways
    - Concern to citizens in small towns where the highway is “Main Street”
    - During the study, LLW trucks used primary rural highway routes in states of Nevada and western Utah to reach the NNSS
- **Background: DRI LLW Truck Study**
  - Most potential exposure information presented to the public based on calculated exposures from models
  - Truck measurements were not available
  - DRI collected data using PIC array stations in 2003 and published as a DOE report in 2005
  - Additional analysis and data incorporated into an article for the Health Physics Journal, published in December 2007
- **Measurements Collected from Trucks**
  - Participation was voluntary
  - Semi-automated system designed to be cost-effective given remoteness of the site and 24-hour arrival of trucks
  - Collected data
    - Measurements for 1,012 shipments between February and December 2003
    - Represented 47% of shipments to the NNSS during the study period
    - 10 of 18 generators participated in study
    - *No indication that any shippers purposely did not use PIC array*
- **Collecting Data for Potential Exposure**
  - Stationary and automated array of four PICS
  - Position of PICS:
    - One meter (3.3 feet) from truck
    - Two on each side of array
    - 1.5 meter (4.9 feet) height
  - Acoustic sensors were a second means of detecting a truck
  - Array designed to simulate condition of a person standing on side of road next to truck
  - Amount of radioactivity can vary between waste containers

- Waste containers come in different shapes and sizes
- Highest of the four PIC measurements was used as the value for the truck
- **Trucks with High Measurements (Greater than 800 Micro-Roentgens per Hour ( $\mu\text{R/hr}$ ))**
  - Discovered after beginning of study that analog measurements on PICs unstable for readings greater than 800  $\mu\text{R/hr}$
  - PICs did not auto scale to readings greater than 1,000  $\mu\text{R/hr}$ 
    - 59 trucks had one or more PIC readings great than 800  $\mu\text{R/hr}$
  - Remedy – Use measurements of trucks taken at waste disposal site for checking US Department of Transportation (DOT) compliance
    - Readings taken at 0.1 (contact), 0.3, and 1.0 meter (3.3 feet) from truck
    - Unidirectional gamma detector used
    - DOT requires that highest spot reading on truck be recorded
- **Quality Assurance Check**
  - 58 of 59 trucks with readings great than 800  $\mu\text{R/hr}$  at PIC array had readings at least as high at one meter at waste disposal site
    - One exception had reading of 750  $\mu\text{R/hr}$
- **Determining Routes Used by Each Truck**
  - Based on Waste Shipment Identification Number for each shipment and logbook records
  - Allowed for calculation of cumulative exposures for individuals along each route
- **Background Measurements**
  - Background radiation was usually between 10-15  $\mu\text{R/hr}$ 
    - Subtracted from truck readings
- **Results**
  - 1,012 trucks measured
    - 483 (47.7%) of trucks could not be distinguished from background
    - 206 trucks (20.4%) were less than 1  $\mu\text{R/hr}$
    - Only 54 trucks (5.3%) exceeded 1,000  $\mu\text{R/hr}$  (or 1 millirem per hour [ $\text{mR/hr}$ ]), and contribute the most to cumulative exposure calculations (DOT standard is 10  $\text{mR/hr}$  or 10,000  $\mu\text{R/hr}$  at 2 meters)
- **Cumulative Exposure Scenarios**
  - Maximum calculated individual exposure\* to a large number of trucks
    - Pedestrian scenario: walking 1 meter (3.3 feet) from truck for 15 seconds
    - Stoplight scenario: park 1 meter from truck for 1 minute at stoplight
    - Fueling scenario: dispensing fuel 1 meter from truck for 30 minutes
    - Goldfield scenario: Receptors located within 5 meters (16.4 feet) of highway when truck stops for 1 minute at stop sign

\*assumes same person for all exposures in each scenario in each town

- **Total Exposures ( $\mu\text{R}$ ) for Each Scenario**

Route	Town	No. of Trucks	Pedestrian	Stoplight	Fuel Attendant	Goldfield
			15-sec @ 1 m	1 min @ 1 m	0.5 hr @ 1 m	1 min @ 4.9 m
1	Pahrump, NV	384 <sup>†</sup>	16	63	1,892	--
2	Amargosa Valley, NV	41 <sup>†</sup>	3	12	364	--
3	Caliente, NV	0	0	0	0	--
4	Tonopah, NV	0	0	0	0	--
5	Delta, UT/ Ely/ Tonopah, NV	425	29	117	3,510	--
6	Salt Lake City, UT/ Ely/ Tonopah, NV	162	806	322	96,692	--
5/6*	Ely/Tonopah, NV	587 <sup>†</sup>	835	3,340	100,202	--
n/a	Goldfield, NV	587	--	--	--	370
All	PIC Array	1,012 <sup>†</sup>	854	3,150	102,458	--

Assumes same person for all exposures in each scenario in each town

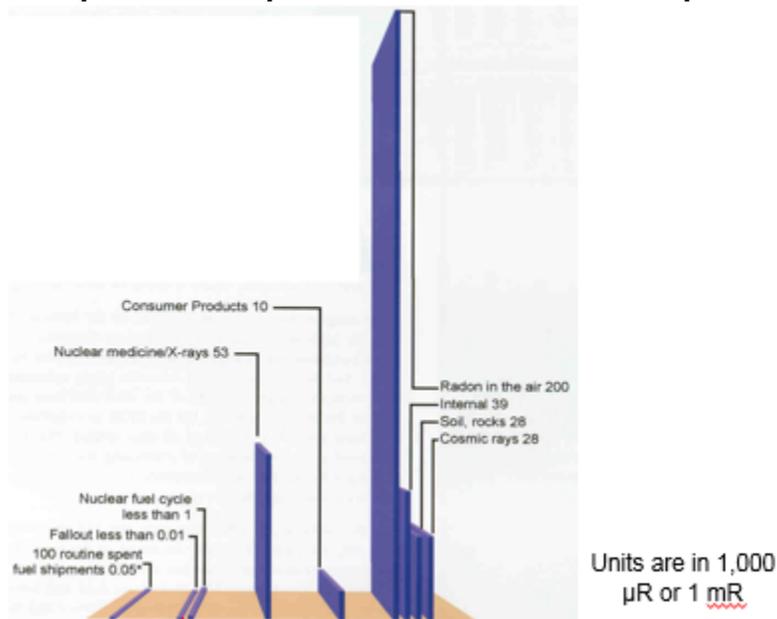
- **Cumulative Exposures**

- Could be strongly influenced by a small percentage of trucks
- Amargosa Valley route for “pedestrian” exposure scenario
  - Same person is exposed to all 41 trucks for a period of 15 seconds
  - Total exposure from all trucks: 3.04  $\mu\text{R}$
  - Exposure after removing truck with highest rate: 1.96  $\mu\text{R}$  (highest rate = 259.20  $\mu\text{R}/\text{hr}$ )
  - *Result: 35% reduction in total exposure!*

- **More Trucks Do Not Equal Higher Exposure**

- Example assumes exposure of 1 hour at 1 meter:
  - Route 6 through Salt Lake City, Utah, and Ely, Nevada
    - 162 trucks with 193,000  $\mu\text{R}$  total net exposure
  - Route 1 through Pahrump, Nevada
    - 384 trucks with 3,800  $\mu\text{R}$  total net exposure
  - Although more trucks traveled on Route 1, the total radiation exposure was much lower than on Route 6

- **Transportation Exposure Measurements Compared to Other Sources of Radiation**



Highest cumulative pedestrian exposure scenario – 800 μR or 0.8 mR.

- **Conclusions**

- About 70% of trucks had no net exposure or were less than 1 μR/hr (1 μR/hr = 1/10,000 of the DOE shipping standard)
- 54 trucks with exposures great than 1,000 μR/hr at 1 meter dominate cumulative exposure calculations, but comply with DOT standards
- No trucks exceed any DOE or DOT standards

- **Closing**

- Largest study ever conducted on potential exposure from trucks during transit
- Identifying range of potential exposures better than averaging
- Data collected in 2003 and published in 2005
  - *Assessing Potential Exposure from Truck Transport of LLW to the Nevada Test Site* (DRI 45208; DOE/NV/13609-37) <http://www.osti.gov/scitech/biblio/860982-assessing-potential-exposure-from-truck-transport-low-level-radioactive-waste-nevada-test-site>
- Additional analysis and data incorporated in Health Physics Journal article published December 2007
  - *Characterizing Potential Exposure to the Public from LLW Transportation by Truck.* Health Physics Journal, Vol. 93, No. 6, December 2007

- **NSSAB Path Forward**

- The NSSAB will provide a recommendation, from a community perspective, on how waste transportation could be improved by DOE

In response to Board questions, the following clarifications were provided:

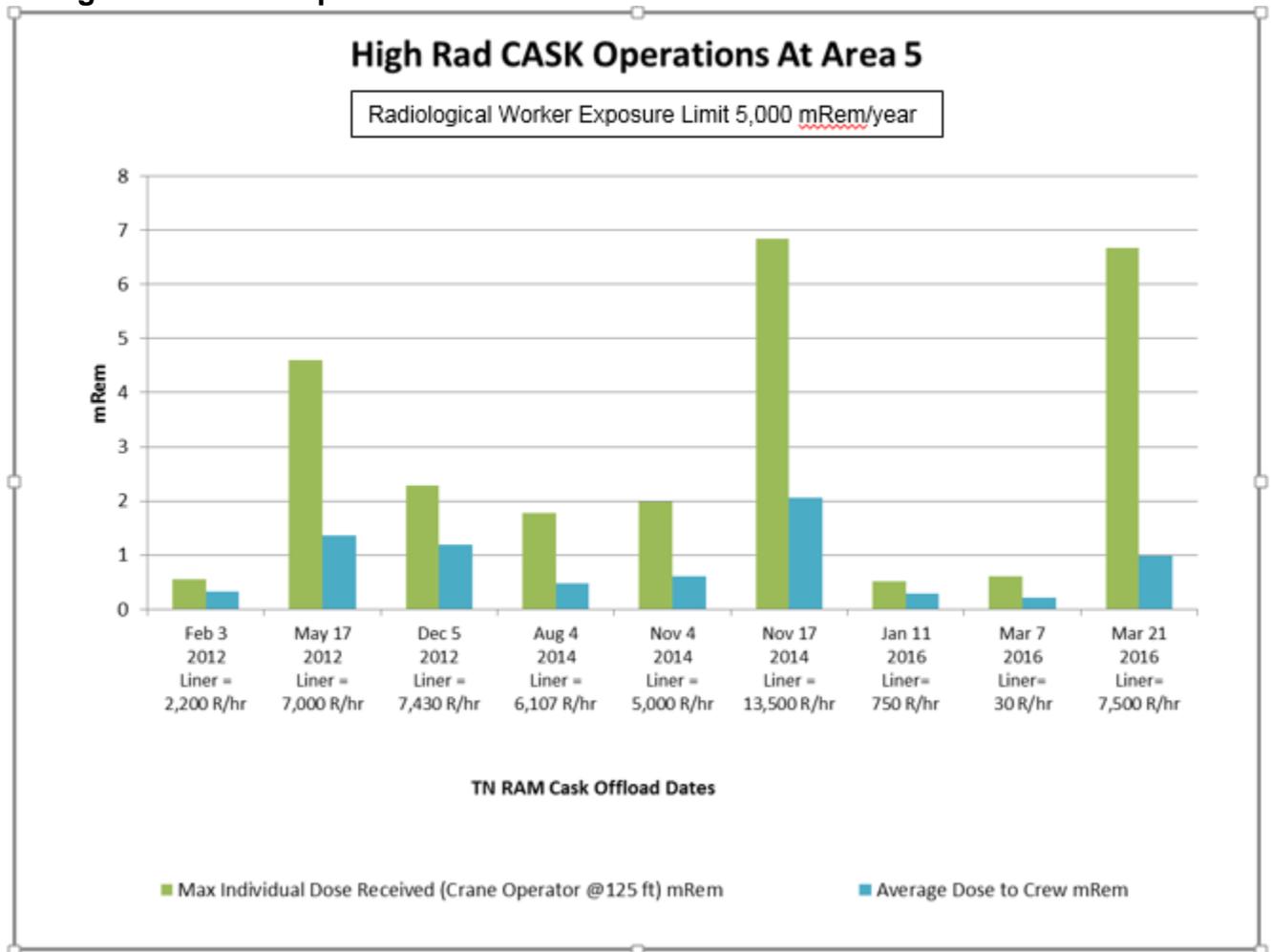
- DOT has exposure limit standards for drivers of radioactive waste shipments.
- A Radiological Control Technician (RCT) surveys a waste shipment and documents where the higher levels of radioactivity are located before it leaves the generator site, which is shared with the driver. The RCT also surveys the cab of the vehicle and readings are required to be under the DOT limits or the shipment needs to be reconfigured before shipping.

- The PIC array station was located at a pullout at the Mercury gate rather than at Area 5 RWMC, because the truck measurements were more accurate due to a number of factors: the trucks are parked closer together at Area 5, the trucks spent more time at the pullout which allowed the PICs to record a more accurate reading, and the background at Area 5 is higher due to the waste cells.
- During the study, dosimetry data was not collected from the drivers. This study was geared toward measuring possible exposures to the public who are driving or walking along waste transportation corridors, especially along the main streets of rural Nevada towns.

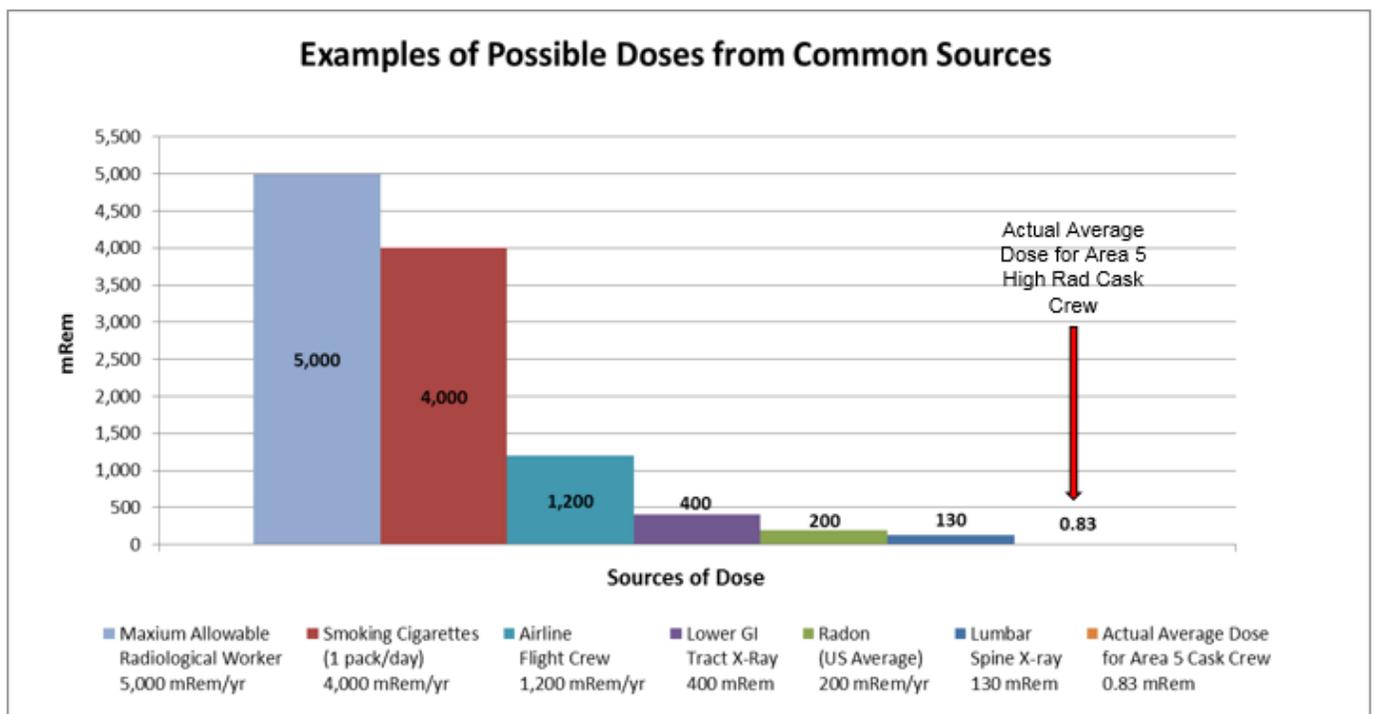
### **Shipments to the NNSA Area 5 RWMC** (*Scott Kranker, NSTec*)

- **Area 5 Receiving Process**
  - Waste is shipped to the NNSA Area 5 RWMC and is met by NNSA personnel
  - Upon arrival, shipping documentation is compared with containers on the truck
  - Each truck/trailer/container is surveyed for dose rate
  - Dose rates are measured to confirm levels are within DOT limits of <200 mRem/hour at trailer surface
  - After inspection, NNSA takes possession and ownership of the material for permanent disposal
  - Trained and qualified Radiological Control Technicians conduct surveys in accordance with established procedures
    - SOP-2151.203, *LLW Handling and Storage Program*
    - Radiological procedure SOP-0441.211, *Direct and Indirect Surveys*
  - Dose rate is measured at the trailer surface with calibrated Ludlum Model 3 or NE Electra instruments
  - Dose rate data is recorded on FRM 0108, *Radiological Survey Report*
- **Process for Disposal: Permanent Burial**
  - After surveys are performed, containers are placed into the disposal cell
  - The container barcode is scanned and identified with its position within the grid system of the cell
  - Four feet of operational cover is placed on top of the waste
  - When the cell is full, an additional four feet of native material cover is placed on the cell as the final closure cap

- High Rad Cask Shipment Dose Rates



- Common Dose Comparison



- **Summary**
  - The exposure limit for a radiological worker is 5,000 mRem per year
  - The average dose per worker on High Rad shipments at the NNSS is .83 mRem
  - Average dose per worker at the NNSS in 2015:
    - 53 monitored personnel
    - 202 mRem total
    - 3.81 mRem per person
  - Team member involvement and process improvement has increased efficiencies and reduced the dose rate to the workers
  - More than 36,000 hours of safe operations since last lost time accident at Area 5

In response to Board questions, the following clarifications were provided:

- The TN RAM Cask is used as an over pack and not buried with the waste.
- The DOE generator owns the waste while it is being transported until the NNSS takes possession and ownership of the material after inspection. From a legal regulatory standpoint, the DOE generator retains responsibility, jointly with the disposal facility, for the waste from “cradle to grave.”
- State regulations regarding radioactive waste shipments may be more stringent, but cannot be less stringent than federal regulations.

### **LLW Transportation Overnighting** (*Robert Boehlecke, DOE*)

- **Shipment Stops within Nevada**
  - Stakeholders requested information on shipments parked at local businesses
  - Between July 2014 and June 2016, some of the 2,678 shipments en route to NNSS either overnighed or stopped for breaks in Nevada
    - 20% of shipments (543) overnighed – majority at Primm (172) or Pahrump (121)
    - 26% of shipments stopped for a break (706); top three stops were Wells (211), Primm (135), and I-15/NV-60 interchange south of Las Vegas (127)
  - Nevada Field Office working with carriers to make notifications when there are extended stops within Nevada
- **Primm, NV**
  - Most often used by drivers to overnight within Nevada
  - Second most often used location for drivers taking breaks within Nevada
- **Pahrump, NV**
  - Second most often used location for drivers to overnight within Nevada
  - Less than 1% of drivers stopped for a break in Pahrump
- **Wells, NV**
  - Most often used location for drivers to take a break within Nevada
  - Only one shipment overnighed in Wells
- **I-15/NV-160 Interchange**
  - Third most often used location for drivers to take a break
  - Less than 1% of drivers overnighed
- **Options for Shipment Drivers**
  - NNSS provides several options to assist transporters who need to drop a trailer load or stay overnight at the site
    - Drivers can overnight at the Mercury Gate 100 (must stay with vehicle)

- Drivers can drop their trailer load with shipping paperwork in the Desert Rock Drop Yard overnight (not secured) and return the next morning for delivery to the Area 5 Radioactive Waste Management Site
- Dorm rooms available for drivers to overnight in Mercury
- NNSW options encouraged to avoid waste shipments parked in a public area (e.g. hotels, truck stops, etc.) any longer than necessary
- NNSW recognizes driver safety/DOT requirements take priority
- **Notifications**
  - Currently, NNSW WAC requires notification to the NFO when there is a transportation incident or emergency situation
  - NFO is working on revisions to NNSW WAC, including enhanced notification requirements
    - Requirement for generator sites to add notification clause in contracts with carriers
    - Carriers to provide written direction to each affected driver identifying events that require notification
    - Drivers instructed to provide notification within one hour of event, with sufficient detail, to the motor carrier's dispatch operation
    - Motor carrier's dispatch operation instructed to provide notification within one hour of notification by the driver, with sufficient detail, to the NNSW Operations Command Center

**NOTE:** NNSW Management & Operating contractor will establish procedures for gathering event-related information and making formal notifications

In response to Board questions, the following clarifications were provided:

- The primary responsibility of the National Response Center is for certain conditions, such as a collision or a release of material.
- With the enhanced notification process, the NFO wants to be aware of transportation incidents earlier in order to respond more timely to questions from the public.
- The DOE does not have a list of approved waste transportation routes, although the NNSW WAC dictates that shipments shall avoid the Hoover Dam Bypass Bridge and the intersection of I-15 and NV-160.

### **NDEP-Conducted Radiological Surveys at the NNSW Area 5 RWMC** (*Chris Andres, NDEP*)

- **Background**
  - Under NDEP/DOE Agreement-in-Principle Section X, LLW Joint Oversight, NDEP subcontracted with Stoller Newport News Nuclear (SN3) to conduct radiological surveys on incoming radioactive wastes at NNSW Area 5 RWMC
- **Objectives**
  - To measure radiation dose rates from radioactive waste packages arriving at NNSW Area 5 RWMC and assess for DOT and NNSW WAC compliance
  - To confirm/verify the presence or absence of removable radioactive contamination on radioactive waste packages and trucks used in transporting the waste packages to NNSW Area 5 RWMC
- **Requirements/Regulations**
  - 49 Code of Federal Regulations (CFR) 173 (DOT) establishes the following requirements:
    - 1. Radiation level limits for radioactive materials transported by road;

- 2. Maximum permissible limits for non-fixed (removable) radioactive contamination on transported packages
- **Requirements/Regulations (49 CFR 173/DOT)**
  - Radiation limit for packages transported by road, on package surface:
    - 2 millisievert/hour (200 mRem/hour) other than closed vehicles
    - 10 millisievert/hour (1,000 mRem/hour) closed vehicles
  - Permissible limits for removable radioactive contamination on packages transported by road:
    - 22 disintegrations per minute/square centimeter alpha-emitting;
    - 220 disintegrations per minute/square centimeter beta-gamma emitting
- **Requirements/Regulations (DOT)**
  - NNSS (DOE) Radiological Control Manual, Rev. 2, 2012 (DOE/NV/25946-801), Chapter 4, Part 2, Article 423.4c establishes requirements that are in conformance with 49 CFR for radiation dose rates and limits for removable contamination
- **Radiological Surveys**
  - Each radiological survey consists of measuring radiation dose rates of incoming waste packages using a hand-held micro “R” meter (at surface, 30 centimeters, and 1 meter)
  - Each survey also included collecting swipe samples from waste packages for direct count (counts per minute/disintegrations per minute) of removable alpha- and beta-contamination/radioactivity potentially present on the waste packages and transporting vehicles
- **Survey Results**
  - Monthly radiological surveys by SN3/NDEP began in October 2015 and are ongoing
  - Measured background activities for alpha- and beta-gamma at the Area 5 RWMC range from 0.5 – 1.5 disintegrations per minute/square centimeter and 90-120 disintegrations per minute/square centimeter, respectively
  - Surveys conducted to date have indicated that radiation dose rates of waste packages arriving at NNSS Area 5 RWMC are well below DOT limits of 200 mRem/hour (49 CFR 173.441)
  - Surveys conducted to date have confirmed that waste packages arriving at NNSS Area 5 RWMC are free of any substantial removable alpha- and beta-gamma radioactive contamination (less than 22 disintegrations per minute/square centimeter alpha, less than 220 disintegrations per minute/square centimeter beta-gamma)
- **Conclusions**
  - To date, radiological surveys conducted by NDEP/SN3 on incoming radioactive waste shipments to the NNSS Area 5 RWMC have confirmed that radiation dose rates and levels of removable radioactive contamination associated with waste packages are in compliance with DOT and DOE regulations for transport of radioactive materials
  - Copies of actual survey reports and data/measurements are available upon request
  - For more specific information, contact John Wong at (702) 486-2850

After all Board questions were answered and discussion completed, Member Edward Rosemark moved to approve a letter going forward with the NSSAB’s recommendations that DOE should continue to pursue enhanced notification requirements for waste transportation carriers who are involved in an incident or an emergency situation en route to the NNSS. Earlier notifications to the Nevada Field Office would allow DOE to respond to public questions in a more timely and efficient manner. In addition, these incidents/situations should be reported utilizing the 24-hour NNSS Operations Command Center phone number. The motion was seconded and passed unanimously.

## **Other NSSAB Business** (*Donna Hruska, Chair*)

Vice-Chair Keiserman provided a Membership Committee update that twelve new members were appointed to the Board and will begin their appointments on October 1, 2016. Two communities (Boulder City and Mesquite, Nevada) not currently on the Board will now be represented. Annual letters to liaison organizations were recently sent out to determine interest in continuing to serve on the NSSAB. County Commissions (Lincoln, White Pine, and Elko) that have participated in the past were also sent letters to inquire whether they would like to again have liaison representation on the NSSAB. Lastly, Vice-Chair reported that a Memo of Understanding for an internship was signed by the professor/advisor and a graduate student from the University of Nevada, Las Vegas and DDFO Kelly Snyder. Under this internship, the student will complete a number of projects and report at upcoming NSSAB meetings.

Chair Hruska noted that elections will be held for the Chair and Vice-Chair positions at the September 21, 2016 Full Board meeting. A list outlining the responsibilities for both positions was provided to the Board. Interested Members are asked to contact the NSSAB Office by August 30, 2016.

DOE budgeted for one NSSAB member to attend the RadWaste Summit in Las Vegas, Nevada on September 7-9, 2016. Steve Rosenbaum volunteered to represent the NSSAB and provide a written report on the proceedings after the conference. Other members are welcome to attend by registering at [www.radwastesummit.com](http://www.radwastesummit.com) and paying their own travel and registration expenses.

Chair Hruska noted that Nevada is hosting the next EM SSAB National Chairs' Meeting at the Las Vegas Marriott, 325 Convention Center Drive, Las Vegas, Nevada, on August 31 – September 1, 2016. A full-day tour of the NNSS is scheduled for Tuesday, August 30 followed by the national chairs' meeting on Wednesday, August 31 through noon on Thursday, September 1. She encouraged members to attend and participate in the meetings/activities. Chair Hruska reported that a committee has been developing a white paper on the EM SSAB for inclusion in the DOE transition materials for the next administration. In the meeting packet, copies of both the round robin slide and Chair Hruska's remarks were available for Board comments. Chair Hruska will present this round robin during the meeting to Monica Regalbuto, Assistant Secretary for EM (EM-1). Any additional comments on either the round robin slide or the remarks can be submitted to Chair Hruska. Vice-Chair Keiserman reminded members that she is putting together a welcome packet for attendees to hand out at the hotel for those attending from other sites. She asked for any ideas for additional items for the welcome packets that would be of interest to attendees.

Eight letters were provided to Board members for informational purposes:

- NSSAB Recommendation to FY 2017 - 2018 Membership – dated May 18, 2016
- DOE Response to FY 2017 - 2018 Membership – dated May 24, 2016
- NSSAB Recommendation to Proposed Changes to Long-term Monitoring at Closed Sites at TTR (Work Plan #2)– dated May 18, 2016
- DOE Response to Proposed Changes to Long-term Monitoring at Closed Sites at TTR (Work Plan #2) – dated June 29, 2016
- NSSAB Recommendation to Revegetation at CAU 111 (Work Plan #3) – dated May 18, 2016
- DOE Response to Revegetation at CAU 111 (Work Plan #3) – dated June 29, 2016

- NSSAB Recommendation to RWAP Assessment Improvement Opportunities (Work Plan #7)– dated May 18, 2016
- DOE Response to RWAP Assessment Improvement Opportunities (Work Plan #7) – dated June 29, 2016

DDFO Snyder informed the Board that DOE is currently developing a list of work plan items for the NSSAB to review and vote on at the September 21<sup>st</sup> Full Board meeting. DOE internally discusses the timing for when to bring work plan items in front of the Board. DOE feels that it is most beneficial to bring in the NSSAB early into the process in order to give the Board a strong voice into shaping a decision. DDFO Snyder also noted that DOE wants the community perspective on the work plan items, and DOE will work with all the other stakeholders involved in the process. By show of hands, the majority of the members preferred to be brought in early in the decision-making process rather than when most of the decisions on a work plan item is final. Since the meetings have been running long, DDFO Snyder concluded that DOE is working toward not having multiple work plan items in a meeting in order for the Board to have more time to discuss and deliberate on each item.

### **Communication Improvement Opportunities (Work Plan #10)**

In response to providing recommendations on ways that DOE can improve/enhance communication to the public, Vice-Chair Keiserman suggested DOE continue to enhance communications with generators and shippers regarding making prior arrangements with businesses in the communities for where the trucks should be parked and when they arrive, etc. This is in an effort to keep the public better informed.

### **Meeting Wrap-Up/Adjournment**

The next Full Board meeting will be held at 4 p.m. on Wednesday, September 21, 2016 at the Frank H. Rogers Science and Technology Building, 755 East Flamingo, Las Vegas, NV.

#### Upcoming Calendar of Events:

- Groundwater Open House in Amargosa Valley – July 26
- Community Environmental Monitoring Program Training in Tonopah – July 30
- LLW Stakeholders Forum in Pahrump – August 11 (note date change)
- EM SSAB National Chairs' Meeting in Las Vegas – August 30 – September 1
- RadWaste Summit in Las Vegas – September 7 - 9
- Full Board meeting in Las Vegas – September 21
- NSSAB Orientation in Las Vegas – October 13
- NSSAB Work Plan Tour of the NNSS – October 26

Any questions on the calendar of events, please contact the NSSAB Office at 702-630-0522.

Member Steve Rosenbaum moved that the meeting be adjourned. The motion was seconded and passed unanimously.

Meeting adjourned at 9:30 p.m.