



SOUTHWEST RESEARCH AND INFORMATION CENTER

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December 28, 2018

Defense Nuclear Facilities Safety Board
625 Indiana Ave NW Suite 700
Washington, DC 20004

Via email: hearing@dnfsb.gov

RE: DOE Order 140.1

Dear Board Members:

Southwest Research and Information Center (SRIC) is a member of the Alliance for Nuclear Accountability (ANA). SRIC fully supports the oral and written comments of ANA submitted at the board's hearings on August 28, 2018 and on November 28, 2018. These comments supplement those ANA comments. SRIC strongly agrees that DOE Order 140.1 should be rescinded, and that the DNFSB should operate consistent with its statutory obligations and responsibilities and that DOE should fully cooperate with those Board activities.

SRIC appreciates the board's actions in holding the two public hearings on August 28 and November 28, including providing time of public comments and livestreaming the hearings. SRIC also appreciates the commitment to have an additional hearing in New Mexico in February 2019, at which hearing SRIC plans to provide additional comments.

SRIC is especially concerned about the potential impacts of DOE Order 140.1 at the Waste Isolation Pilot Plant (WIPP). As indicated by the Staff Exhibit 9 at the August 28 hearing and Staff Exhibit 3 at the November 28 hearing, because WIPP has no Safety Class Controls, DNFSB access to the facility could be minimized or eliminated by the Order. Such a practice would be contrary to Public Law No. 100-456 and subsequent statutory authorizations and to the Board's Mission of protecting public (and worker) health and safety at defense nuclear facility sites, of which WIPP is one.

Further, regulation and independent oversight of WIPP is required by the WIPP Land Withdrawal Act of 1992, Public Law 102-579. That law makes clear that DOE must comply at WIPP with "all other applicable Federal laws pertaining to public health and safety or the environment." Section 9(a)(G). Thus, SRIC believes that DNFSB's authority extends to WIPP under that law, notwithstanding DOE Order 140.1.

DNFSB's reports and recommendations prior to the February 2014 WIPP fire and radiation release should have provided warnings to DOE management and contractors to change operational and maintenance practices in ways that could have prevented those two events. Unfortunately, WIPP officials largely ignored those, and other, concerns about the facility prior to the 2014 events. DNFSB monthly reports since those 2014 events are frequently the initial public notice of continuing problems at WIPP, which is itself an important function of the Board. Further, the continuing safety issues noted in the current Monthly Reports should be addressed to avoid future incidents that endanger worker and public health and safety and could result in additional shutdowns of the facility.

A year's worth of the board's monthly reports provided some of the information used by SRIC's expert witness, George Anastas, regarding public health and safety issues at WIPP at a New Mexico Environment Department hearing in Carlsbad, New Mexico on October 25, 2018. That prefiled testimony is attached.

Representatives from SRIC and other community organizations in New Mexico have quarterly conference calls with Todd Shrader, the CBFO Manger, about the facility, its operations, and health and safety issues. Issues included in the DNFSB Monthly Reports are sometimes subjects directly discussed in those calls. Thus, the Board staff concerns can be amplified by public organizations, as well as the reports providing essential information, which sometimes is otherwise not publicly available. On those calls, SRIC makes clear its continuing concerns about health and safety problems not being adequately addressed.

Rather than reducing DNFSB presence at WIPP, as could result from implementation of DOE Order 140.1, SRIC advocates that DNFSB should increase its presence at WIPP to more than the 1.9 person-weeks/month in fiscal year 2018 and the 2.0 person-weeks/month so far in fiscal year 2019, as reported in the Monthly Reports for August 2018 and November 2018. SRIC also believes that the significance of WIPP to other defense nuclear facility sites and the safety problems at WIPP and inability of DOE and Nuclear Waste Partnership (NWP), the operating contractor, to safely operate the facility should result in the Board strongly considering having resident inspector(s) at WIPP.

Thank you for your consideration of these comments.

Sincerely,



Don Hancock

Director, Nuclear Waste Program

cc: Todd Shrader, DOE CBFO Site Manager

Statement by George Anastas on Behalf of Southwest Research and Information Center Relating to

NOTICE OF INTENT TO APPROVE A CLASS 3 MODIFICATION TO CLARIFY TRU MIXED WASTE DISPOSAL VOLUME REPORTING AT THE WASTE ISOLATION PILOT PLANT (WIPP) CARLSBAD, NEW MEXICO Facility Name: Waste Isolation Pilot Plant

Good day. My name is George Anastas, and I am a resident of New Mexico. Attached as Appendix A is a brief Curriculum Vitae addressing my qualifications. Succinctly, I am a Professional Nuclear Engineer, a Board-Certified Environmental Engineer, a Certified Health Physicist, a Fellow of the Health Physics Society, and a Fellow of the Australian Radiation Protection Society with over 50 years of experience in radiation, environmental, occupational and nuclear safety.

I have relied upon the References to this Statement and over 50 years of experience reading and understanding a variety of radiation and nuclear safety technical documents. Some of these include the following:

Atomic Energy Commission (WASH-740), The Brookhaven Report; WASH-1400 (The Rasmussen Study, for example),

Reports by the Energy Research and Development Administration,

Reports by the Department of Energy (many of the WIPP related documents),

Reports by the Environmental Evaluation Group,

Reports and memoranda from the Defense Nuclear Facilities Safety Board,

Graduate texts and courses in Health Physics,

Graduate courses and texts in Nuclear Engineering (including The Plutonium Handbook Volumes 1 and 2 authored by Wick; Engineering for Nuclear Fuel Reprocessing by Justin Long; Principles of Nuclear Reactor Engineering by Gladstone),

Environmental Health by Dade Moeller;

and Nuclear Chemical Engineering by Manson Benedict and Thomas Pigford.

The purpose of my testimony is to highlight only a few of the issues concerning the activities at the Waste Isolation Pilot Plant (WIPP) under the direction of the U.S. Department of Energy (DOE), the Carlsbad Field Office of the DOE (CBFO) and Nuclear Waste Partnership LLC (NWP).

Before I begin, I am pleased that the New Mexico Environment Department (NMED) will rest its decision of this Permit Modification Request on a number of strong statements. Among these statements are the following: (Reference 1).

- 1) “NMED is charged with issuing a permit that will ensure that WIPP’s hazardous waste operations are managed in a manner protective of human health and the environment.”
- 2) “WIPP is a facility authorized by Congress for the disposal of TRU radioactive waste materials generated by atomic energy defense activities of the United States.”
- 3) “Generally, TRU mixed waste consists of clothing, tools, rags, residues, debris, soil and other items contaminated with radioactive elements, mostly plutonium, and hazardous components consisting of RCRA-listed heavy and toxic metals, RCRA-listed organic residues (non-liquid), and RCRA-listed inorganic and organometallic compounds.”

DOE and NWP desire to change the methodology of calculating the volume of waste disposed at WIPP in order to recover lost WIPP capacity, caused by foreseeable and preventable accidents and poor planning of Remote Handled Waste placement. DOE and NWP would thus place an excess of waste containers and waste volume in WIPP exceeding that authorized by the WIPP Land Withdrawal Act.

Based upon a critical review of WIPP operations over the past several years and my training, experience and qualifications, I am professionally opposed to the present Class 3 Modification predominately because of the information and data articulated in this Statement including the References utilized in this Statement,

many of which are authored by representatives of the U.S. Department of Energy and its contractors.

I submit that DOE and NWP do not possess the skills and commitments that would justify expanding the operations of WIPP beyond the limits contained in the Land Withdrawal Act and undertaking new responsibilities in managing the measurement and emplacement of additional new waste volume. In fact, these References disclose a very sorry state of affairs in implementing a reasonable maintenance, safety awareness and professional system for the operation of a Transuranic Waste burial facility deep underground. The history includes, electrical issues, fire and smoke occurrences, and potential, roof fall safety questions, and a myriad of other concerns. NMED should review these References and will probably shudder at the disclosures by DOE, DOE contractors and the Defense Nuclear Facilities Safety Board representatives. Moreover, NMED should review the Mine Safety and Health (MSHA) reports on WIPP. Space and time do not provide me an opportunity to summarize any of the MSHA Reports. Nevertheless, the MSHA reports on WIPP are hereby incorporated by Reference into this Statement. The DOE itself captures, in the References to this Statement, the apparent laissez-faire attitude regarding the safety at WIPP by CBFO and NWP:

“Repeat deficiencies were identified in DOE and external agencies assessments, e.g., Defense Nuclear Facility Safety Board (DNFSB) emergency management, fire protection, maintenance, CBFO oversight, and work planning and control, but were allowed to remain unresolved for extended periods of time without ensuring effective site response.” (U.S. Department of Energy, Phase 1, Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014, April 2014)

External Agencies Assessments

In the interest of brevity, I will address a few portions of several assessments by one, independent and very well respected and qualified agency:

The Defense Nuclear Facilities Safety Board, an independent oversight organization within the executive branch, was created by Congress in 1988 to provide advice and recommendations to the Secretary of Energy regarding public health and safety at the defense nuclear facilities managed by the Department of Energy. The latest DNSFB Monthly Reports regarding WIPP from September 1,

2017 until August 3, 2018, written by qualified representatives of the DNFSB illuminate many of the shortcomings of WIPP operation and maintenance. These recent (2017/2018) Reports should eliminate any claims by DOE and NWP that the issues that arose in the past have been corrected and there are no new issues. These Reports clearly and unambiguously present a technical and safety overview that indicates that WIPP still poses a significant risk to occupational, public and environmental safety. These Monthly Reports are grouped together as Reference 2. Several excerpts from these DNFSB Reports follow:

“September 1, 2017

Prior Roof Falls. Carlsbad Field Office (CBFO) oversight staff are concerned that a thorough investigation was not performed by the contractor to identify the cause of previous roof falls (e.g., Panel 3 and 4 access drifts in September and October 2016 and Panel 7, Room 4 in November 2016), nor actions taken to prevent recurrence.

Automatic Fire Suppression Systems (AFSS). More than three years following the February 2014 truck fire, WIPP continues to experience repeated problems with properly installing AFSS on underground liquid fueled vehicles. The most recent failure involved an incorrectly installed compression fitting that ruptured during testing of the system.

December 1, 2017

Fire Protection. On November 21, 2017, the Deputy Assistant Secretary for Safety, Security, and Quality Assurance (EM-3.1) sent a memo that requires WIPP to provide a plan for prioritizing and funding a list of WIPP’s fire protection issues.

WIPP had an inadvertent discharge of a fire suppression system on November 14. The cause was the operator round sheet was not updated to match the current system configuration. A newly qualified operator repositioned a valve to match the listed position, which released the nitrogen.

Emergency Evacuation. The motor on an electric cart in the underground was discovered to be smoking on November 27. All personnel donned breathing devices and completed the evacuation within the one-hour time limit.

Series 860 Mine Fan Reliability. One series 860 fan is required to be in-service to provide the baseline underground ventilation flow. The 860-fan maintenance has been an ongoing issue (tracked in monthly reports since July) due to WIPP's ineffectiveness in addressing key maintenance issues. WIPP recently shifted to running the 860A fan as the in-service fan when the 860B fan showed excessive vibrations. The 860A fan has recently been returned to service following a complete overhaul. Despite the recent maintenance, the 860A is also running with excessive vibrations. The 860C fan is degraded and remains solely available for emergency use.

January 5, 2018

Supplemental Ventilation System (SVS) Start-Up. CBFO has not given NWP permission to run the SVS system for normal operations. CBFO has outstanding issues with the mine ventilation plan documentation for the configuration with the SVS operating. Additionally, NWP has not yet tested the UVS/SVS interlock with the 860C fan as the in service UVS fan, to ensure that SVS will trip if the 860C fan trips. This interlock is designed to prevent unexpected air flow conditions that may result from SVS operating without any UVS fan running. SVS will not be run in conjunction with the 860C fan until the interlock tests are completed satisfactorily.

TRUPACT-II Venting Deadline Exceeded. WIPP violated the Nuclear Regulatory Commission (NRC) requirement to vent a controlled waste package within ten days of its closure prior to shipping. WIPP reported to the NRC that WIPP had exceeded the required time period because of administrative errors. Corrective actions are being taken to prevent recurrence.

February 2, 2018

Safety Basis. CBFO still has some remaining open items before they approve the safety evaluation report for Documented Safety Analysis and Technical Safety Requirements (TSR) revision 6. WIPP also declared a Potential Inadequacy in the Safety Analysis due to the lack of TSR controls limiting the number of vehicles with < 29 gallons of combustible liquids and no automatic fire suppression system that can be present within 200 feet of the waste face.

Freeze Prevention Issues. Despite having a history of being challenged by freeze protection and a winter readiness procedure, WIPP has not effectively implemented the corrective actions that prevent line freezes and damage to equipment. In early January, WIPP experienced low temperatures that resulted in multiple fire protection line breaks. WIPP's decontamination trailer water line froze, rendering the decontamination trailer inoperable. WIPP's previous decontamination trailer froze three years ago.

March 2, 2018

Underground Ventilation System (UVS) Series 860 Mine Fan

Reliability. The 860-fan maintenance has been an ongoing issue (tracked in monthly reports since July) due to WIPP's ineffectiveness in addressing key maintenance issues. Most recently, WIPP is experiencing issues with the breaker racking apparatus and outlet damper position indication for the 860B/860C fans respectively.

April 6, 2018

Safety Significant Confinement Ventilation System (SSCVS) Design

Process. In a letter dated March 26, 2018, the Board communicated concerns that the final design of WIPP's SSCVS does not include integration of the underground continuous air monitoring (CAM) system. DOE's Carlsbad Field Office (CBFO) considers the interface between the SSCVS and the CAMs, which are expected to provide the actuation signal to realign the system into a safe condition in the event of a radiological release, to be outside of the design project scope.

Ground Control. CBFO identified and declared a stop work for operations in the south end of the underground due to an excessive number of broken roof bolts which indicates a lack of maintenance of the ground support systems. The stop work was lifted once the area of concern was declared off limits. A quarterly Mine Safety and Health Administration (MSHA) inspection in other areas of the underground indicated that there have been some improvements in underground ground control and it appears that WIPP is addressing some of MSHA's citations.

May 4, 2018

Unplanned Bus Outage. WIPP remains in an abnormal electrical line-up, due to the unexpected loss of B bus on March 22, 2018. B bus, one of WIPP's two 13.8kV electrical distribution buses that power all plant electrical equipment, remains de-energized while all site loads are powered by the A bus. The plant electrical distribution system remains in a degraded status; a single failure to A bus will result in the temporary loss of all site electrical power. WIPP suspects that the event was caused by the failure of an abandoned-in-place current transformer on one phase of the B bus. The other two phases of B bus and all three phases of A bus have matching legacy current transformers.

NWP has not provided an occurrence report for this event, any other form of report on the event, or any contingency actions that WIPP has established to respond to subsequent failures while in this degraded condition. NWP has determined that this event does not require tracking in WIPP's corrective action system. DNFSB staff has requested the details of this event and any subsequent analysis.

June 1, 2018

Work control and maintenance program issues. (Partial)

WIPP remains in a degraded, abnormal electrical line-up caused by the loss of the B bus, with all site loads powered by the A bus (see April 2018 report). The central uninterruptable power supply also remains out of service and the non-safety backup diesel generators have experienced reliability issues for many months. A single failure to the A bus will result in the loss of all site electrical power until a diesel generator is manually started and then loaded. Nuclear Waste Partnership, LLC (NWP), has determined that the failure that led to the loss of B bus does not require tracking in their primary corrective action system. The Board's staff is still pursuing the causes or extent of condition associated with this event.

Waste Shipments. WIPP personnel identified two transuranic waste transportation containers (TRUPACT-II) from Oak Ridge National Laboratory (ORNL) that included waste assemblies with external alpha contamination levels above WIPP's waste acceptance criteria. This has prevented WIPP from emplacing these waste assemblies. Personnel at ORNL had informed WIPP that they had detected the contamination but concluded that it was from radon progeny, and therefore was shippable to

WIPP. WIPP personnel determined that the contamination was not from radon, and are developing a path forward. There are several other loaded TRUPACT-IIIs from ORNL at WIPP with waste from the same waste stream that have not yet been unloaded.

July 6, 2018

Waste Management. WIPP continues to receive shipments from Idaho National Laboratory and Oak Ridge National Laboratory (ORNL). Shipments from ORNL continue to have elevated radiological readings of swipe samples upon opening the shipping container. The waste from ORNL consist of several drums with significant concentrations of radium and its decay products (progeny). One of the radium progeny is radon gas, which passes through the drum filters and accumulates in the shipping container. The radon gas subsequently decays, yielding ionized particulate that clings to the plastic stretch wrap around the drums. The ionized particulate on the plastic undergoes alpha decay, which is detected when the shipping containers are unpacked. These elevated radiological readings exceed the contamination levels in the WIPP waste acceptance criteria (WAC). Although there is no evidence that this is a significant nuclear safety hazard, compliance with the WAC is required by the WIPP safety basis.

UVS. CBFO sent a letter directing NWP to address several problems with the UVS including ventilation flow rates being less than the design values and airflow directions not being fully understood in the underground. The letter notes that the problems are associated with the air quality issues for underground workers that have been known for some time but have not been adequately addressed after less formal communications were sent to NWP. The ventilation flow direction is also key to reducing the risk of radiological exposure to workers during accident conditions. CBFO specifically directed NWP to identify the causes of circulating air currents, verify that air flows in the mine ventilation plan are correct, and demonstrate the air monitoring program can accurately determine the necessary air flow for underground activities.

August 3, 2018

Underground Ventilation. As reported last month, CBFO sent a letter on May 17th directing NWP to address several problems with underground air quality. CBFO also directed NWP to verify that the direction of air flow is in

compliance with the Mine Ventilation Plan for specific ventilation systems configurations for the underground. As part of the response, NWP collected various data sets of the underground ventilation conditions. CBFO identified problems with the data collected by NWP. One of the problems was that NWP did not control the configuration of the ventilation systems while taking data. This caused the data to be invalid. In addition, CBFO identified inconsistencies regarding how NWP took the air flow measurements. In another set of data, CBFO noted that air flow direction was not consistent with the direction specified in the Mine Ventilation Plan. As a consequence, NWP is implementing corrective actions to collect new sets of data and to develop a new procedure to control the configuration of the ventilation systems.

Waste Management. WIPP continued to receive shipments from Oak Ridge National Laboratory (ORNL) with elevated radiological readings of swipe samples upon opening the shipping container. The Board's staff is coordinating an interface with DOE to discuss the WIPP Waste Acceptance Criteria (WAC) for external contamination, associated limiting conditions of operation, and the path forward to deal with these ORNL shipments as well as future shipments with elevated radiological readings.”

NMED must reject the DOE and NWP claims that all these (many, many) shortcomings have been fixed. There are more instances that might be reasonably disclosed if there were an additional independent oversight organization on site. The DNFSB has been involved with health and safety evaluations at WIPP for many years and with other DOE facilities for still more years. Perhaps that is one reason why DOE recently initiated a significant attempt to weaken the DNFSB oversight. Congress, thankfully, has raised significant concerns about this effort by DOE in Public Law 115-244.

The Volume of the Container IS the Volume of the Waste Disposed at WIPP

For decades the DOE, including representatives of the CBFO, have promised, stated and otherwise made known to the people of New Mexico that the volume of waste buried at WIPP is the volume of the container. During a WIPP Quarterly Meeting in 2002, Roger Nelson, as I recall, then Chief Scientist at CBFO, was asked about the volume of waste in a container. He responded that the volume of the container is the volume of waste.

Subsequently at a “get together” sponsored by Dr. Ines Triay, Manager of the CBFO at that time, at her home in Carlsbad to which representatives of the Environmental Evaluation Group (EEG) were invited, I asked a similar question of Dr. Triay. The answer was essentially the same as Roger Nelson’s answer, the volume of the container is the volume of waste and that it would be time-consuming and not cost effective to measure the volume of waste in a container.

Ever since WIPP was planned and operated the volume of waste was, for all the reasons articulated by Dr. Triay, equal to the volume of the container disposed of at WIPP.

Now we have before us DOE’s classic bait and switch gambit to change how the volume of waste is measured. NMED, in the interests not of DOE and NWP, but rather of New Mexico, and to keep the promises made to New Mexico, should reject the DOE/NWP proposal with prejudice.

The Past is Prologue to the Future, References 3, 6, 7, 8 and 9 Contain a Plethora of Significant Shortcomings of the Carlsbad Field Office and Nuclear Waste Partnership LLC

There have been a number of significant accidents at WIPP, however I will speak briefly about just two of them.

Salt Truck Fire

The first foreseeable and preventable accident I will address is the Salt Truck Fire (Reference 3) on February 5, 2014.

“The fire is believed to have originated in the truck’s engine compartment and involved hydraulic fluid and/or diesel fuel which contacted hot surfaces on the truck, possibly the catalytic converter, and then ignited. The fire burned the engine compartment and consumed the front tires, contributing significantly to the amount of smoke and soot in the underground.”



Salt Truck after the fire (Source: DOE)

“(T) the Facility Shift Manager (FSM) directed the CMRO (ed. Central Monitoring Room Operator) to switch the ventilation system from normal to filtration mode believing this would reduce both the fire and smoke in the underground. However, this resulted in the flow of smoke into areas of the underground, which the workers expected to have “good” air. Eighty-six workers were in the underground and a total of 13 workers were treated; six transported to a local hospital and seven treated on-site.”



Smoke from the smoke truck fire billowing out the salt shaft! (Source: WordPress.com)

“The (DOE Investigation) Board identified the root cause of this fire to be the failure of Nuclear Waste Partnership LLC (NWP) and the previous management and operations (M&O) contractor to adequately recognize and

mitigate the hazard presented by fire in the underground. This includes recognition and removal of the buildup of combustibles through inspections and periodic preventative maintenance (i.e. cleaning up), and the unwise decision to deactivate the automatic salt truck onboard fire suppression system.”

Contributing causes pertinent to the Salt Truck Fire deserve external to DOE and external to NWP illumination. So much for safety culture!!!

The Investigation Board identified ten causes contributing to this accident or the deficient response:

- “1. The preventative and corrective maintenance program did not prevent or correct the buildup of combustible fluids on the salt truck. There is a distinct difference between the way waste-handling and non-waste-handling vehicles are maintained.
2. The fire protection program was less than adequate in regard to flowing down upper-tier requirements relative to vehicle fire suppression system actuation from the Baseline Needs Assessment into implementing procedures. There was also an accumulation of combustible materials in the underground in quantities that exceeded the limits specified in the Fire Hazard Analysis (FHA) and implementing procedures. Additionally, the FHA does not provide a comprehensive analysis that addresses all credible underground fire scenarios including a fire located near the Air Intake Shaft.
3. The training and qualification of the operator was inadequate to ensure proper response to a vehicle fire. He did not initially notify the CMR that there was a fire or describe the fire's location.
4. The CMR Operations response to the fire, including evaluation and protective actions, was less than adequate.
5. Elements of the emergency/preparedness and response program were ineffective.
6. A nuclear versus mine culture exists where there are significant differences in the maintenance of waste-handling versus non-waste-handling equipment.
7. The NWP Contractor Assurance System (CAS) was ineffective in identifying the conditions and maintenance program inadequacies associated with the root cause of this event.

8. The DOE Carlsbad Field Office (CBFO) was ineffective in implementing line management oversight programs and processes that would have identified NWP CAS weaknesses and the conditions associated with the root cause of this event.

9. Repeat deficiencies were identified in DOE and external agencies assessments, e.g., Defense Nuclear Facility Safety Board (DNFSB) emergency management, fire protection, maintenance, CBFO oversight, and work planning and control, but were allowed to remain unresolved for extended periods of time without ensuring effective site response.

10. There are elements of the Conduct of Operations (CONOPS) program that demonstrate a lack of rigor and discipline commensurate with the operation of a Hazard Category 2 Facility.”

Detonation of LANL Drum 68660

The second foreseeable and preventable accident I will discuss is the February 14, 2014 Valentine’s Day event involving DOE and Los Alamos National Laboratory (LANL). This accident (really cost the taxpayers over \$1,000,000,000 (that is 1 billion US dollars) was a not unforeseen event. In the 1990s the Environmental Evaluation Group (EEG), an independent agency tasked with overseeing the planning, construction and operation of the WIPP, took note of the reports of exploding drums of waste in the DOE complex. EEG queried DOE regarding the incidents and prepared an independent report on the exploding drums (Reference 4). Subsequently the EEG report was published in a very well-respected journal, Nuclear Safety (Reference 5). It should be noted that in 2004 DOE arranged for EEG to cease operation, and thus eliminating an independent oversight agency, just as DOE has proposed severely limiting the independent oversight of DOE total operations by the Defense Nuclear Facilities Safety Board.

DOE’s anecdotal response to EEG’s report regarding the plethora of DOE exploding waste drums was “We will start clean and operate clean, there is no way any waste drum placed in WIPP would catch fire or explode” or words to that effect. Excuse me.



LANL Waste Drum 68660 after detonation deep inside WIPP resulting in over \$1,000,000,000 and a multi-year shutdown of WIPP (source: DOE)

On February 14, 2014, an incident in Panel 7 Room 7 (P7R7) of the Waste Isolation Pilot Plant (WIPP) underground repository resulted in the release of radioactive material (predominately Am-241, Pu-239, Pu-240 and Pu-241) into the environment and contaminated 22 people with low-level radioactivity.

The (DOE) Technical Assessment Team (TAT) concluded that one drum, Drum 68660, was the source of the radioactive contamination released in the February 14, 2014, radiological event. The contents of Drum 68660 were chemically incompatible, and the drum breached as a result of internal chemical reactions.

The TAT concluded that chemically incompatible contents in Drum 68660, in addition to the configuration of materials in the drum, supported exothermic chemical reactions that led to a thermal runaway. In other words, a series of ever-increasing heat-releasing reactions occurred, which led to the creation of gases within the drum. The resulting build-up of gases within the drum displaced the drum lid, venting radioactive material and hot matter that further reacted with the air or other materials outside the drum to cause the observed damage in P7R7 of WIPP.

“Key Judgment 1. The contents of Drum 68660 were incompatible. The nitrate salt residues, organic sorbent (Swheat Scoop®), and neutralization agent (triethanolamine) known to be present represent a potentially reactive chemical mixture of fuels and oxidizers.

Key Judgment 2. Drum 68660 breached as a result of internal chemical reactions. Experiments showed that various combinations of nitrate salt, Swheat Scoop®, nitric acid, and oxalate self-heat at temperatures below 100°C. Computer modeling of thermal runaway was consistent with the observed 70-day birth-to-breach of Drum 68660.

Key Judgment 3. Drum 68660 was the source of radioactive contamination in WIPP. Images of drums in P7R7 do not show additional breaches. Uranium, plutonium and americium isotopic measurements on post-event samples are consistent with the recorded contents of Drum 68660 and suggest that this drum was the source of the radioactive contamination.

Key Judgment 4. The thermal runaway was initiated by internal, and not external, events. The TAT considered that perhaps a thermal pulse, combustion products, exothermic reactions of water with magnesium oxide (MgO) located in bags on top of the waste containers of P7R7, or reduced ventilation in WIPP following a truck fire nine days prior may have contributed to the release event. Various computer models simulating these scenarios, chemical analyses and experiments designed to characterize changes in drum color due to heating, did not support any considered externally-initiated mechanisms.

Key Judgment 5. Thermal and pressure effects resulted in the movement of material during the release event and caused the damage in P7R7. Post-event video images showed disintegration of 17 MgO sacks on top of the waste containers. A computational fluid dynamic model of a release from the position of Drum 68660 produced a damage footprint consistent with the damage observed in WIPP. (References 6 and 7)”

As an engineer, it is most interesting that the contents of the drum contaminated well over 2000 linear feet of the underground, then some radioactive materials were trapped on filters, some bypassed these filters and were released to the site and the atmosphere...and the radioactive content of LANL Drum 68660 was less than 9 grams of Plutonium and Americium, less than ½ (less than 0.5) of a sugar

packet one uses for coffee in the morning. Reference 8 shows the purported mass of the radioactive contents of LANL Drum 68660.

“Radiological survey results of Panel 7 indicated that the general surface alpha contamination levels in Room 7 of 8,000 – 40,000 dpm, Room 6 of 10,000 – 20,000 dpm, and Room 1 of 6,000 – 28,000 dpm. More specific details are provided in Section 6.3, Radiological Forensics (Figure 2-1).” (Reference 9) (Note: DOE and its contractors use dpm as disintegrations per minute, which is really nuclear transformations per minute)

From AR 180914.32G at 151-152.

**Table 6-12: Drum 68660 NDA
Corrected Results**

Nuclide	Activity (Ci)
^{241}Am	2.20E+00
$^{243}\text{Am}^*$	3.403E-04
^{237}Np	2.58E-05
^{238}Pu	2.08E-02

Nuclide	Activity (Ci)
^{239}Pu	4.63E-01
^{240}Pu	1.21E-01
^{241}Pu	2.00E+00
^{242}Pu	1.05E-05
^{234}U	4.63E-05
^{235}U	1.15E-06

* Drum 68660 NDA re-evaluation changed ^{243}Am from initial NDA results to non-detected, presumably due to very low levels. ^{243}Am retained from original data for purpose of comparison.

Additionally, U.S. Department of Energy, Phase 1 Report, Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014, April 2014 (Reference 10) states:

“The Board determined that the NWP maintenance and engineering programs have not been effective in keeping critical pieces of equipment in a high state of operational readiness. The cumulative impact of the combination of degraded equipment on overall facility operational readiness was not adequately considered. There is an acceptance to tolerate or otherwise justify (e.g., lack of funding) out-of-service equipment.”

And:

“The condition of critical pieces of equipment, such as the 700 exhaust fans, indicated that management had not taken prompt action to resolve longstanding deficiencies. The accelerated corrosion of components in the U/G ventilation system enhanced by water intrusion below the surface in the exhaust shaft has not been effectively evaluated and mitigated. Many items have been out of service or in a reduced status for more than six months. It was not clear that NWP had a clear approach to prioritizing maintenance

activities in regard to critical equipment or that there is an effective formal process to identify compensatory measures other than a fire watch for impaired safety-related equipment.”

One Example of Opacity of CBFO and NWP

After the disaster of exploding LANL Drum 68660, a several members of the public requested to review the data from the radiation surveys taken in the underground, noting that the pretty colored diagrams presented at the WIPP Town Hall Meetings were next to worthless. Persons volunteered to drive to Carlsbad to view the data. Both CBFO (who undoubtedly saw and perhaps have the data) and NWP out and out refused to release the data. The data were paid for by taxpayers, and CBFO and NWP refused to allow the public access to these data. Rather than transparency, opacity seems to be the watchword.

Disposal of Spent Nuclear Fuel and High-Level Waste at WIPP

The WIPP Land Withdrawal Act unambiguously prohibits the disposal of spent nuclear fuel and high-level waste. Nevertheless, the U.S. DOE disposed of commercial domestic (Quad Cities, H.B. Robinson, Surry, Limerick, Three Mile Island, Braidwood, Browns Ferry, Dresden, Turkey Point and Zion) and foreign (an un-named CANDU reactor, Belgonair Reactor-3) spent nuclear fuel and high-level waste from UREX reprocessing all originating at the Argonne National Laboratory. (Reference 11)

The shipment left Argonne on September 13, 2013, was received at WIPP on September 15, 2013 and was placed in Panel 6, Room 2 on September 18, 20 and 21, 2013. As one can surmise, the shipment of spent nuclear fuel and high-level waste was very quickly shipped, received and buried underground.

Today’s WIPP Is Not the WIPP That Was Evaluated for NEPA Compliance in The Last Century

It is obvious that today’s WIPP is not the WIPP that was evaluated for National Environmental Policy Act (NEPA) compliance several decades ago. Major foreseeable and preventable accidents have occurred injuring workers and exposing workers above ground and the environment to transuranic waste (What ever happened to “Start Clean and Stay Clean?). Vast areas of the underground have been grossly contaminated with Plutonium and similar long-lived radionuclides, the physical structure of the facility has been vastly changed (a new exhaust shaft, for example) and additional major changes are either underway or

planned, WIPP has knowingly received and buried spent nuclear fuel and high-level waste. The cost to the taxpayers of the foreseeable and preventable salt truck fire is unknown. Exploding drum 68660 resulted in over \$1,000,000,000 in added costs to the taxpayers.

Conclusion and Summary

I am of the opinion, based upon the past 20 or so years, that the Environmental Management Operation at the U.S. Department of Energy, the DOE Carlsbad Field Office and NWP are incapable of safely and efficiently operating the Waste Isolation Pilot Plant without undue risk to the public, occupational health and protection of the environment. Accordingly, the requested Class 3 Modification must, in all reasonableness, be rejected.

REFERENCES

- 1) August 6, 2018 Fact Sheet, Notice of Intent to Approve a Class 3 Modification, New Mexico Environment Department
- 2) Monthly Reports by Staff of the Defense Nuclear Facility Safety Board regarding WIPP dated September 1, 2017, October 6, 2017, November 3, 2017, December 1, 2017, January 5, 2018, February 2, 2018, March 2, 2018, April 6, 2018, May 4, 2018, June 1, 2018, July 6, 2018 and August 3, 2018.
- 3) U.S. Department of Energy, Accident Investigation Report, Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014, March 2014
- 4) Environmental Evaluation Group-Report 48, An Assessment and Flammability and Explosion Potential of Transuranic Waste, Matthew Silva
- 5) Nuclear Safety, Volume 33-2, April-June 1992, An Assessment and Flammability and Explosion Potential of Defense Transuranic Waste, Matthew Silva
- 6) U.S. Department of Energy, Investigation of Incident at Waste Isolation Pilot Plant by Technical Assessment Team, Fact Sheet, March 2015
- 7) U.S. Department of Energy, Waste Isolation Pilot Plant Technical Assessment Team Report, March 17, 2015, SRNL-RP-2014-01198, Revision 0
- 8) Radioassay Data Sheet for LANL Drum 68660, Dated 6.6.14
- 9) U.S. Department of Energy Phase 2 Radiological Release Event at the Waste Isolation Pilot Plant, February 14, 2014 April 2015
- 10) U.S. Department of Energy, Phase 1, Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014, April 2014
- 11) George Anastas Statement Before the U.S. Environmental Protection Agency (EPA) Regarding Recertification of the Waste Isolation Pilot Plant June 17, 2015, Albuquerque, New Mexico

Appendix A

Brief CV of George Anastas

Mr. Anastas professional qualifications include: Professional Nuclear Engineer, Board-Certified Environmental Engineer (in Radiation Protection), Certified Health Physicist, Fellow of the Health Physics Society and a Fellow of the Australasian Radiation Protection Society.

He holds a Bachelor of Science Degree with a Major in Physics from the State University of New York at Albany and, while a U.S. Public Health Service Fellow, he received an MPH in Radiological/Environmental Health from the University of Minnesota.

He completed post Masters study in Environmental Engineering and Nuclear Engineering at Rensselaer Polytechnic Institute with a focus on a technology assessment of reactor fuel reprocessing. His career began in 1967 and he has held technical and management positions in industry, academia and government in New Mexico, California and New York including: Criticality and Nuclear Engineer at the Plutonium Storage Facility at the Western New York Nuclear Service Center, Senior Nuclear Engineer and Manager of the Generation Engineering Department at San Diego Gas and Electric, Director of Environmental Health and Safety and University Radiation Safety Officer at California State University Sacramento, Health Physicist/Nuclear Engineer with the New Mexico Environmental Evaluation Group (EEG) and Safety Officer at the University of New Mexico. In addition, he has have provided radiation safety and nuclear engineering consulting services for organizations in the United States and overseas.

He has published and presented papers relating to radiation, environmental, occupational and nuclear Safety.

He has testified before local and state agencies in New York and California. He has presented sworn testimony before the California Public Utilities Commission, the California Energy Commission, the New York State Public Service Commission and the New York State Board on Electric Generation Siting and the Environment. He has testified before the President's Commission on Air Quality. He has presented professional testimony before the U.S. Environmental Protection Agency and the National Academies of Sciences, Engineering and Medicine.

Appendix B

Radioassay Data for LANL Drum 68660. 6.6.14

 Radioassay Data Sheet

Engine Version: MRes. Cmb. V1.2

Count Sequence Number: 24046	Batch Number: 1LANDA1885
Assay Instrument: MCS HENC #1	Location: LANL TA-54
Analysis Method: CCP-TP-063 v 15	Software Version: NDA 2000 V.4.0
Item ID: 68660	Analysis Date: 1/2/2014

Net Weight	82600.0 g
Pu mass	8.01E+000 +- 1.24E+000 g
TRU Alpha Activity	2.80E+000 +- 3.48E-001 Ci
TRU Activity Concentration	3.39E+004 +- 4.21E+003 nCi/g
Pu-239 Equivalent Activity	2.84E+000 +- 3.48E-001 Ci
Pu-239 FGE	7.87E+000 +- 1.16E+000 g
Decay heat	9.20E-002 +- 1.15E-002 W

Nuclide	Mass g	Activity Ci	Activity Uncert. Ci	MDA Ci
NP237	3.66E-002	2.58E-005	4.45E-006	2.00E-006
PU238	1.22E-003	2.08E-002	3.22E-003	4.96E-005
PU239	7.46E+000	4.63E-001	7.14E-002	1.10E-003
PU240	5.31E-001	1.21E-001	1.86E-002	2.87E-004
AM241	6.41E-001	2.20E+000	3.40E-001	5.23E-003
PU241	1.95E-002	2.00E+000	3.10E-001	4.77E-003
PU242	2.65E-003	1.05E-005	1.62E-006	0.00E+000
SR90	<LLD	<LLD	0.00E+000	0.00E+000
CS137	<LLD	<LLD	0.00E+000	4.75E-007
U233	<LLD	<LLD	0.00E+000	4.42E-003
U234	7.45E-003	4.63E-005	1.29E-005	0.00E+000
U235	5.31E-001	1.15E-006	3.20E-007	1.08E-006
U238	<LLD	<LLD	0.00E+000	1.10E-005
AM243	1.71E-003	3.41E-004	5.91E-005	5.93E-006

Errors quoted at 1,000 sigma

Operator: Redacted Date: 6.6.14

ITR: Redacted Date: 6-6-14