SRS Citizen's Advisory Board

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Nuclear Materials Committee Meeting

Aiken Municipal Conference Center
Aiken, SC
September 14, 2005

The Savannah River Site (SRS) Citizens Advisory Board (CAB) Nuclear Materials Committee met on Wednesday, September 14, 2005, 5:00 PM, at the Aiken Municipal Conference Center. The purpose of this meeting was to discuss the Criticality Safety; H-Completion Criticality Safety Improvement; and NM Committee discussion of GAO report on Plutonium Storage at SRS, and to hear public comment. Attendance was as follows:

CAB Members	**Stakeholders**	**DOE/Contractors**
- Joe Ortaldo	Murray Riley	Gerri Flemming, DOE
- Perry Holcomb	Mike French	Phil Breidenbach, WSRC
- Karen Patterson	Cynthia Gilliard	Jack Devine, WSRC
- Bill Willoughby	Bill McDonel	Nick Delaplane, DOE
Bob Meisenheimer	Jim Mullaney	Paul Sauerborn, WSRC
- Jean Sulc	* Rick McLeod	Teresa Haas, WSRC
Manuel Bettencourt	Jeff Selvey	Patrick McGuire, DOE
	Herbert Bencourt	Norman Shepard, DOE
	Dennis Baker	John Dickenson, WSRC
	Robert Beliles	Jim Moore, WSRC
	Fitz Trumble	Loe Carter, WSRC
		Tom Campbell, WSRC

Regulators
Jim Barksdale, EPA
John Richards, EPA

*- NM committee members * CAB technical advisor*

Note: Gerry Devitt is a CAB member of the NM committee, but was unable to attend this session.

Welcome and Introduction:
Gerry Devitt, Chair, welcomed those in attendance and asked them to introduce themselves

Criticality Safety: John Dickenson stated that the purpose of this presentation will be to define the following for public understanding:

- Nuclear Material
- Nuclear Criticality

- Consequences of an accidental nuclear criticality
- How to prevent accidental nuclear criticality

Mr. Dickenson stated that nuclear material is a term that refers to naturally occurring radioactive source material such as natural uranium or it is any by-product material that was made radioactive by exposure to radiation. It also includes a specific group of materials that is referred to as Special Nuclear Materials or SNM. SNM is defined under the Atomic Energy Act as plutonium, uranium-233 and uranium enriched in the isotopes uranium-233 or uranium-235. The SNM group does not include source material such as natural uranium. Mr. Dickenson explained that under very specific conditions, SNM can sustain a nuclear chain reaction – either for generating electrical power or, at much higher concentrations for explosives. If the SNM is in a form that can be used in a nuclear weapon, it is often times refereed to as weapons-grade material.

Mr. Dickenson stated that a controlled nuclear criticality is one which occurs in a reactor in accordance with established procedures. An uncontrolled nuclear criticality is a nuclear criticality which occurs because procedures were inadequate and/or were not followed, and/or equipment did not operate properly and/or other things went wrong. Mr. Dickenson explained the characteristics of a criticality accident which lasts for less than one second as:

- Radiation – a release of a large amount of radiation in the form of neutrons and gamma rays.
- Thermal Energy – the average release is the equivalent of 30,000 BTU's of energy, which is enough to completely vaporize 4 gallons of water.
- Blue Flash – Delivered by the "Cerekov radiation effect" – radiation (visible light) is emitted when charged particles travel through a medium at a speed greater than the speed of light in that medium. When radiation goes through the fluid in your eye, it will give off energy in the wave length of blue light.
- Chemical Smells – Ionized may also produce ozone from oxygen in the air which may be detected by its characteristic odor.

Mr. Dickenson sited an example of an accidental criticality at the Los Alamos National Laboratory in 1958. He pointed out that there had never been an accidental nuclear criticality at the Savannah River Site, noting that a criticality in the SRS would not result in a nuclear detonation (mushroom cloud), but it could present a dangerous level of radiation to personnel depending on their proximity and available shielding.

Mr. Dickenson, stated that the SRS uses the Integrated Safety Management System (ISMS) in order to prevent an accidental nuclear criticality. He defined ISMS as a continuous circle of checks and balances starting with defining the scope of work; analyze hazards; develop/implement controls; perform work safely; feedback/improvement; returning to define scope of work. An example of nuclear criticality safety controls would be that SRS limits the amount and types of nuclear material in tanks and containers to minimize the chances of criticality. In addition, SRS also designs there facilities using such items as overhead cranes, lead lined gloves, shielded glove boxes, reinforced piping, specially designed tanks, etc. to minimize exposure to personnel. Mr. Dickenson made special note to the documentation of nuclear criticality controls. The facility design basis and strict operational requirements including criticality safety limits are reviewed and approved by DOE as part of the authorization to operate a facility where nuclear materials are present. In conclusion, Mr. Dickenson stated

that SRS uses double contingency principles, passive engineered equipment/facilities, active engineered equipment, administrative controls, and defense in depth.
Questions: Karen Patterson asked if the ISMS process can always apply in every category of event. Mr. Dickenson stated that the answer is yes. The operators are given written and oral testing, and demonstrate proficiency on the job before they are released to do the work. Bob Meisenheimer asked of there was a stand minimum number of controls established. Mr. Dickenson stated that there was no minimum standard, and that in every case the double contingency approach is used. Ms. Patterson asked if there was an accidental criticality at SRNL what would be the effect on the residence living on Green Pond road. Mr. Dickenson stated that there would be a zero effect on those individuals.
H-Completion Criticality Safety Improvement: Phil Breidenbach stated that his presentation would characterize recent events, describe improvement actions, and present current status of the H-Completion Criticality Safety Improvement. Westinghouse Savannah River Company (WSRC) is committed to excellence in all aspects of safety, especially nuclear safety, with goals of no criticality events and to decrease the frequency and severity of criticality related issues. Mr. Breidenbach used a quote from senior manager Jack Devine as "Our most vital obligation is to maintain the highest standards of safety and especially nuclear safety" (June 10, 2005 Letter, J.C. Devine, Jr., WSRC, to Kevin W. Smith, DOE-SR).
Mr. Breidenbach sited recent events at SRS and the actions taken to improve as follows:

- Change of dissolver before a criticality safety calculation was completed, which was caused by inadequate communication and an inadequate procedure.
    - Improvement action short term
        - After the dissolver event the immediate actions were a two day stand down starting on June 9th
        - Added senior engineer with criticality expertise
        - Increased involvement of the Criticality Safety Committee
    - Improvement action long term
        - Top to bottom review of the H-Completion Project (HCP) criticality safety program
        - Review of all operating procedures for fissile material
        - Conducted level of knowledge testing of HCP personnel relative to criticality safety
        - Reevaluate cross qualification initiatives to ensure adequate knowledge and proficiency
        - Strengthened the assessment process associated with criticality safety
        - Authorized funding for implementation of engineered controls to replace some administrative controls
        - Initiated integrated root cause analysis of recent events

- Potential transfer to an evaporator of solution exceeding allowable grams of Uranium, which was caused by procedure noncompliance and an unnecessarily complex procedure.
    - Suspended fissile operation July 1
    - Management Control Plan approved July 13th, which described the causes of the problems and the actions that would complete prior to resuming fissile operations

Mr. Breidenbach explained the Management Control Plan as containing the following:

- Common Causes

    - Inadequate disciplined operations
        - Procedure compliance
        - Specificity of communication
    - Inadequate 1st and 2nd Line Leadership
    - Inadequate defense in depth in procedures
    - Unnecessarily complex procedures
- Strategy
    - Prioritized system review
    - Manage from the war room
    - Operator/first line manager/system engineer teams formed
        - System engineers put on shift to work with operators
- Improvement actions
    - People
        - Disciplined operations leadership sessions – focus on expectations and accountability
        - Shift proficiency demonstration
        - Senior supervisory watch
    - Procedures
        - Criticality control
        - Procedure review
    - Plant
        - System walkdowns
        - Distributed Control System (DCS) review
    - Status
        - 17 systems reviewed and released for operations
        - 465 procedures reviewed
            - 207 procedures containing criticality safety steps revised
            - 20 procedures deactivated
            - procedural complexity reduced
            - defense in depth increased
        - 200 training sessions conducted for 120 individuals
        - Double Contingency Analysis (DCA) improvements
            - Credited existing engineered controls versus administrative controls
            - Created DCS alarms to augment administrative controls
            - Tightened implementation of DCA controls in procedures
    - Independent reviews
        - Washington Group International Evaluation Team
            - Causes were correctly identified
            - Improvement actions will work if executed well
        - WSRC Root Cause Team
            - Causes were correctly identified
            - Improvement actions will work if executed well

In conclusion, Mr. Breidenbach stated that the CAB and public should now understand the importance of criticality safety, the causes and events, that SRS takes aggressive and thorough

corrective action, and that the site has always been safe and now the site is even more safe. Jean Sulc asked how the site knows to go back and review. Mr. Breidenbach stated that frequent self assessments aid the site in improving in all aspects of work. Manuel Bettencourt asked if the site conducts rehearsals of the process activities. Yes, the site uses pre job briefings. Mr. Holcomb asked if all the operators knew the "stop work" procedure. Mr. Breidenbach stated that they totally understand and that the new term used at SRS for "stop work" is "time out".

Committee Discussion of GAO Report to Congressional Committees (GAO-05-665): Karen Patterson led the discussion and asked for input on the GAO report and received the following responses:

- Mr. Holcomb wanted to see and hear more about the Nuclear Materials Disposition and Consolidation Coordination Committee (NMDCCC).
- Mike French indicated that there was a large amount of repetition throughout the GAO report.
- Jean Sulc stated that the NMDCCC would be briefing the CAB Chairs meeting next week.
- Mr. Holcomb stated that he was confused about the Authorization Act of 2002, which states there must be a disposition path if material is shipped to SRS.
- Rick McLeod stated that there should be a presentation from DOE on their responses to the GAO report, and how does the Energy Authorization Act effect SRS

Ms. Patterson welcomed all comments and directed Mr. McLeod to begin a draft motion on the need the SRS CAB has for more information on this topic.

Public Comment: Jean Sulc reminded everyone at the meeting that Rick Arkin would be at the CAB meeting in Columbia on September 26 and 27. She stated that Mr. Arkin would be talking about national security.

Adjourn:

Karen Patterson adjourned the meeting at 7:25PM.