

UPDATE ON WASTE ISOLATION PILOT PLANT RECERTIFICATION-2009 - 10221

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ABSTRACT

The U.S Department of Energy (DOE) is required to periodically document the continued compliance of the Waste Isolation Pilot Plant (WIPP) with the Environmental Protection Agency's (EPA) disposal regulations. This documentation is submitted to EPA every five years, beginning from the initial receipt of transuranic (TRU) waste at the WIPP. EPA's recertification review focuses primarily on the changes since the previous recertification(s). One of the documentation challenges is to easily show where changes have occurred relative to previously submitted compliance documents.

Discussions between the DOE and the EPA about the content and format of the Compliance Recertification Application (CRA) due in 2009 began shortly after the 2004 recertification application was approved by EPA. Those discussions resulted in two major process improvements and a large number of minor changes. The first major improvement was to organize the CRA to match the topics in each of the numbered sections of the 40 CFR Part 194 [1] regulations. The second major improvement involved providing electronic hyperlinks from citations in the document to the relevant sections in specific references. These major improvements are intended to expedite the EPA's review of the recertification application by having consistent formats between the DOE's application and the EPA's compliance reports and by automating the process of finding reference materials that are relevant to the application.

The most recent CRA [2] was submitted on March 24, 2009. The EPA immediately started their completeness review. The EPA's completeness review requires a thorough examination of the CRA for compliance with legislated disposal standards. In addition, the EPA is required to solicit and respond to public comments.

This paper describes the processes used to develop and review the CRA recently submitted to the EPA and the process improvements associated with interactions between the DOE, the EPA and stakeholders.

INTRODUCTION

The process for approving the disposal of TRU waste at the WIPP is defined in the 40 CFR Part 194 regulations [1]. The first regulatory submittal by DOE to the EPA was the Compliance Certification Application (CCA) [3] in 1996. When the WIPP regulatory compliance staff began writing the application, the 40 CFR Part 194 regulations were not final. DOE worked closely with the EPA while writing the CCA. Such involvement likely influenced the EPA in how they structured and organized the final regulations now found in 40 CFR Part 194. However, the format and organization of the CCA was fixed before the final version of 40 CFR Part 194 was available, and DOE chose not to re-format the almost completed application.

That initial application was organized with nine chapters and 56 appendices, along with numerous annexes associated with many of the appendices. The EPA's detailed review comments and conclusions were organized in Compliance Application Review Documents (CARDS), which followed the then final 40 CFR Part 194 regulations. For example, 40 CFR § 194.44 defines the requirements for engineered barriers, and CARD 44 was used to present EPA's regulatory position on engineered barriers.

The WIPP Land Withdrawal Act (LWA) (Pub. L. 102-579, 106 stat. 4777, as amended by Pub. L. 104-201, 110 stat. 2422) [4] requires the DOE to submit a recertification every five years after the initial receipt of TRU waste for disposal at the WIPP. The first receipt of waste occurred on March 26, 1999, therefore CRAs were due on March 26 in 2004 and 2009 and will be again in 2014 and so forth. The CRAs are required by 40 CFR § 194.15 to update information provided in previous applications with any new data that has been gathered in the previous five years and to "provide sufficient information for the (EPA) to determine whether or not the WIPP continues to be in compliance with the disposal regulations." [1]

In late 2001, the DOE began evaluating the CCA [3] to determine what specific information needed to be updated for the recertification application due in 2004 (CRA-2004). The initial evaluation focused on content. Much of the information in the CCA appendices was baseline historical information that would not change over time, such as geological studies that characterized the WIPP site (Appendix FAC) and site specific testing and studies (Appendix SUM). It was decided that DOE should make an effort to consolidate multiple appendices that dealt with a common subject such as performance assessment (PA).

In negotiations between DOE and EPA about the structure of the CRA-2004 [5], it was agreed that the CRA would be formatted in a manner similar to the CCA, that is, nine chapters with numerous appendices and annexes. The base text would be CCA text. New and updated information for the CRA appeared as **bold, blue italicized** text to distinguish it from CCA text. Deleted CCA text was shown with a ~~strike through~~. (Figure 1) This format was selected because one of EPA's primary objectives is to identify "what had changed" in the application. EPA

didn't want to make a side-by-side comparison of the CCA and CRA-2004 in order to determine what had changed, and requested that the old and new text be included in one document. In practice, the approach of using a single document with **bold text additions** and ~~striketroughs~~ was not optimal for the EPA's review because of the complexity introduced by multiple additions and deletions, as illustrated in Figure 1.

The DOE has concluded that it is desirable to add MgO to the repository to improve *the* performance of the disposal system (see Appendix ~~BACK~~**BARRIERS**). This additive ~~will be~~*is being* protected in *supersacks* until the *supersacks* are broken during creep closure of the room. The MgO ~~backfill will be~~*is being* ~~purchased~~ *prepackaged* in ~~the proper containers~~*polypropylene supersacks* for emplacement in the underground. *Emplacement in supersacks (1) facilitates handling and emplacement of MgO; (2) minimizes potential worker exposure to dust; and (3) minimizes the exposure of periclase, the main, reactive constituent of MgO, to atmospheric carbon dioxide (CO₂) and water prior to rupturing of the supersacks.* ~~Purchasing prepackaged backfill eliminates handling and placement problems associated with bulk materials, such as dust creation. In addition, prepackaged materials will be easier to emplace, thus reducing potential worker exposure to radiation.~~

Fig 1 – An example of the text format used in the CRA-2004 [5], Chapter 3.

Other changes that occurred between the CCA [3] and CRA-2004 [5] related to the number of copies, the page count of the application and the media upon which it was submitted. In 1996, the EPA required 25 paper copies of the CCA [3], which consisted of over 80,000 pages, and five paper copies of all the references. DOE rented a small moving van to deliver the CCA and supporting references to the EPA in Washington, D.C. In 2004, with the increased use of electronic documentation and the search capabilities available with electronic media, the submittal requirement was changed to five paper copies of the application, which consisted of approximately 20,000 pages, five paper copies of all references and ten electronic copies of the application. The paper savings alone was enough to save over 250 trees.

BREAKING THE MOLD, A NEW FORMAT

Shortly after the EPA issued its approval of the CRA-2004 [5], discussions began between the DOE and the EPA about the format and content of the next CRA (2009). WIPP authors, reviewers and decision makers involved with the production of the CRA-2004 generated lessons learned. EPA and DOE also shared what worked, what didn't work and what could have been better. For example, the thought of updating CRA-2004 text with a third layer of *bold, colored, italicized* and ~~striketrough~~ text to distinguish the updates for CRA-2009 from the original CCA text and the changes for the CRA-2004 appeared totally impractical, so a new document layout

and organization was required for the CRA-2009. These discussions resulted in two major process improvements and several minor changes.

The first major improvement was to organize the CRA to be consistent with the 40 CFR Part 194 regulations. It was quickly decided to abandon the CCA format with its nine chapters, and to organize the CRA-2009 using the individual sections of 40 CFR Part 194. This was a very reasonable approach because EPA had established a format through their use of CARDS and Technical Support Documents (TSDs). This change would make the CRA-2009 easier for DOE to produce plus it would assist EPA by reducing the time needed to make a completeness decision.

The new format for the individual sections in CRA-2009 is similar to that used in EPA's CARDS and TSDs. Each of the 23 sections of 40 CFR Part 194 is addressed individually. Each corresponding section of the CRA allows the reader to trace the historical progression of information presented in the DOE's applications and the EPA's evaluation of this information. Each section of the CRA contains the following elements:

- The specific requirement in the relevant section of 40 CFR Part 194, such as in 40 CFR § 194.8
- A discussion of historical and background information
- A summary of the EPA's 1998 Certification Decision (as found in the appropriate CARD and certification decision) [6]
- A discussion of any changes that DOE presented in the CRA-2004
- A summary of the EPA's 2006 Recertification Decision (as found in the appropriate CARD and recertification decision) [7]
- A discussion of any changes or new information that have occurred since DOE submitted the CRA-2004, and a brief statement of the DOE position that demonstrates continued compliance with the requirement
- A list of references that support the material presented.

The second major improvement involved providing hyperlinks from citations in the electronic version of the document to the individual references. Documentation to be hyperlinked included the CCA [3], the CRA-2004 [4] and the references from current and previous applications, including copyrighted material. References were self-contained i.e., included in the compilation, as opposed to citing the Federal Document Management System or EPA's eDocket hyperlinks. Reference citations were linked, when possible, to a specific page or paragraph in the reference that was relevant to the citation. This feature is essential for expediting the EPA's review of a citation from what is often a long section or multipage reference. Citations for specific parameter values and DOE and national laboratory document numbers were also linked in a similar fashion, whenever possible.

In creating electronic hyperlinks to materials referenced in the CRA-2009, the goal was to use the “newest technology available”. Extensible Markup Language (XML) and the Hypertext Markup Language (HTML) platforms were used to electronically link citations in the electronic versions of the document to the individual references. Because XML and the HTML are World Wide Web (WWW) Consortium standards, the XML-based CRA worked in all common web browsers. Compatible browsers include Internet Explorer[®] (post version 5.5, which is when Microsoft[®] implemented the XML standards), Firefox[®], Safari[®] and Opera[®].

The most basic, common XML and HTML features were used to avoid any possible conflicts or standards that are not universally implemented. These same technologies and methods are commonly used on the Internet for PCs, PDAs, MP3 players and cell phones, among other devices. All of the cited references were in portable document format (PDF), which requires Adobe Acrobat[®] or Adobe Reader[®] which are generally available. Using this software structure facilitated access to specific locations in referenced materials.

These major improvements have been successful in expediting the EPA’s review of the recertification application by having consistent formats between the DOE’s application and the EPA’s compliance reports and by automating the process of searching reference materials that are relevant to the application.

SUBMITTAL MEDIA AND COPIES

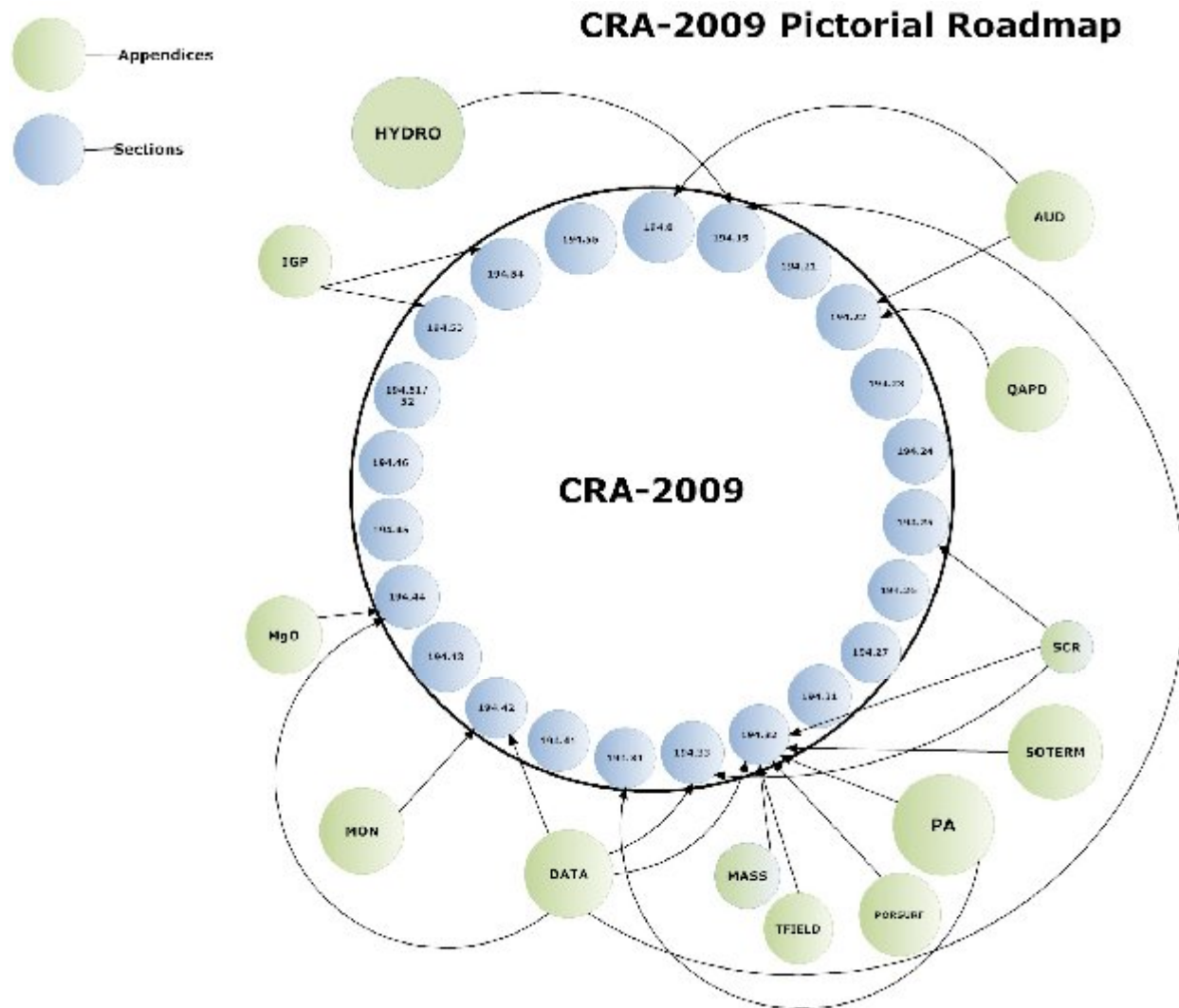
DOE was required by 40 CFR § 194.12 to submit five hard copies and ten electronic copies of the CRA-2004. For the CRA-2009, the DOE proposed submitting electronic copies only, consistent with EPA-related waste minimization initiatives. In addition, 40 CFR § 194.15(a) required the submittal of five hard copies and 10 electronic copies of all CRA-2004 references. For CRA-2009 references, the DOE proposed submitting electronic copies only.

After EPA issued written guidance, in response to DOE’s proposal, the DOE provided the EPA’s Washington D.C. Offices with one paper and five electronic copies of the CRA-2009. Five electronic copies of all references were also provided. Publisher’s permission was obtained to distribute five “limited” copies of copyrighted references only to the EPA. In addition, electronic copies of the CRA-2009 and references were distributed to three New Mexico (NM) Reading Rooms, the NM Governor’s Office and to those stakeholders organizations that requested a copy. The EPA also placed the application on their docket.

IMPLEMENTING THE CHANGE

Agreeing to change to the new CRA format and adding the capability to hyperlink references was easy. After securing EPA and DOE agreement on these changes, the complex and tedious task of embedding hyperlink text began. New Mexico stakeholder input was solicited. Stakeholders basically took the wait and see approach to the proposed format and content changes but did agree that the concept had merit.

Once agreement on the new format was reached, work began on developing an annotated outline that showed the general topics to be discussed in each of the “194” sections. For example, the proposed topics for discussion in Section 44 that deals with engineered barriers included geochemical descriptions, Magnesium Oxide (MgO) safety factor and panel closures. The text would also include a discussion on the formal planned change request that DOE submitted to the EPA for reduction in the MgO safety factor and the EPA’s decision on that request. Further, the annotated outline was expanded to show links between various sections and which appendices would be used to provide additional details. Figure 2 represents the relationship between all sections and appendices. In addition, the CRA Style Guide (Style Guide) used to prepare the CRA-2004 was reviewed and updated to account for the new format and other lessons learned from developing and submitting the previous application. The most significant change to the Style Guide was the process of linking a document citation to the electronic reference via XML hyperlinks.



AUD = Audits and Surveillances
 CRA = Compliance Recertification Application
 DATA = Monitoring Data and Reports
 HYDRO= Hydrological Investigations
 IGP = Individual and Groundwater Protection Requirements
 MASS = Performance Assessment Modeling Assumptions
 MgO = Magnesium Oxide as an Engineered Barrier
 MON = WIPP Monitoring Programs
 PA = Performance Assessment
 PORSURF = Porosity Surface
 QAPD = Quality Assurance Program Document
 SCR = Features, Events, and Processes Screening for PA
 SOTERM = Actinide Chemistry Source Term
 TFIELD = Transmissivity Fields

.8-Gen. site QA & WAC Compliance
 .15-Recertification
 .21-Inspections
 .22-Quality Assurance

.23-Models and Codes
 .24-Waste Characterization
 .25-Future Site Assumptions
 .26-Expert Judgment
 .27-Peer Review
 .31-Release Limits
 .32-Scope of Performance Assessment (PA)
 .33-Drilling
 .34-PA Results
 .41-Active Institutional Controls
 .42-Monitoring
 .43-Passive Institutional Controls
 .44-Engineered Barriers
 .45-Presence of Resources
 .46-Removal of Waste
 .51/52-Protection of Individuals
 .53-Underground Drinking Water
 .54-Compliance Assessment
 .55-Compliance Assessment Results

Fig 2 – CRA-2009 Pictorial Roadmap showing the relationship between sections and appendices

With agreement on how topics were distributed between the 194 sections and appendices, authors went about creating draft text. Text was generated in phases based on a schedule agreed to by all WIPP participating organizations. As initial text was generated, it was formatted for consistency. These draft versions were reviewed in an interactive context with feedback going to the author. The review process and resources used to maintain configuration management of the document is described in another paper entitled, “The Use of Web-based Technology for Creating Large Regulatory Documents” that will be presented later in this session.

Final text was formally reviewed using a quality assurance process defined in Quality Assurance Requirements for Nuclear Facility Applications [8] of documenting comments and their resolution. After those technical and editorial comments were incorporated, the final draft was submitted to DOE Headquarters for programmatic and legal review. The final product was transmitted in accordance with the LWA [4] from the Secretary of Energy to the EPA Administrator on March 24, 2009.

WHAT CHANGED FROM THE CRA-2004 TO THE CRA-2009

Changes in content between the CRA-2004 and the CRA-2009 included numerous updates related to new data, such as environment monitoring. In addition, other changes were made based on TRU waste inventory updates, performance assessment computer code improvements, and operational planned changes (MgO excess factor reduced from 1.67 to 1.2).

The inventory used in the CRA-2009 PA is slightly different from that used in the CRA-2004. The WIPP project updates its inventory of stored and anticipated waste on an annual basis to accurately reflect the ongoing changes at the DOE generator sites regarding WIPP-bound waste streams. A summary of the recent changes to the inventory [2] include:

- The addition of an estimated 17,998 m³ of pre-1970 buried TRU waste from Idaho National Laboratory comprising five waste streams
- The following new container types: ten-drum overpack, 5 × 5 × 8 boxes, 100-gallon (gal) drums and pipe overpacks within drums
- The density of cellulosic, plastic and rubber (CPR) materials in emplacement materials was considered for the first time.

Other changes to the CRA-2009 PA include parameter updates, code improvements and corrections. Upgrades were made to the computational platform used to execute the CRA-2009 PA. The CRA-2009 PA also included changes to gas generation modeling, PA parameters, new Culebra transmissivity fields (T fields) and revised calculations of spillings releases during drilling.

Several developments associated with the MgO engineered barrier have occurred since the EPA's 2004 Recertification Decision, including the DOE's submittal and subsequent EPA approval of a planned change request to reduce the amount of MgO placed in the repository. These developments include a change in MgO vendor, the EPA's approval of the DOE's planned change request to dispose of compressed (supercompacted) waste, and the EPA's approval of the DOE's planned change request to reduce the MgO excess factor from 1.67 to 1.20.

The CRA-2009 assesses the combined effect of any new changes on the performance of the disposal system and concludes that the WIPP continues to comply with the individual and groundwater protection standards in 40 CFR Part 191 Subparts B and C. As with the conclusions of past applications, the combined effects of changes analyzed in CRA-2009 do not adversely impact performance or compliance; the predicted releases from the repository remain well below the limits specified in Part 191 Subpart B.

Similarly, compliance analyses performed on the undisturbed repository result in a single postulated release whose value is significantly smaller than even the very small release estimated by the same analyses in the CCA. The results demonstrate a greater-than-95% level of statistical confidence that the overall mean of the population of complementary cumulative distribution functions (CCDFs) is in compliance with the containment requirements of 40 CFR § 191.13. The overall mean CCDFs of the CCA, CRA-2004, and CRA-2009 are shown in Figure 3 and illustrate the wide margin of compliance of the predicted releases, as shown by the CCDFs, with respect to the release limits, represented by the dashed stair-steps in Figure 3.

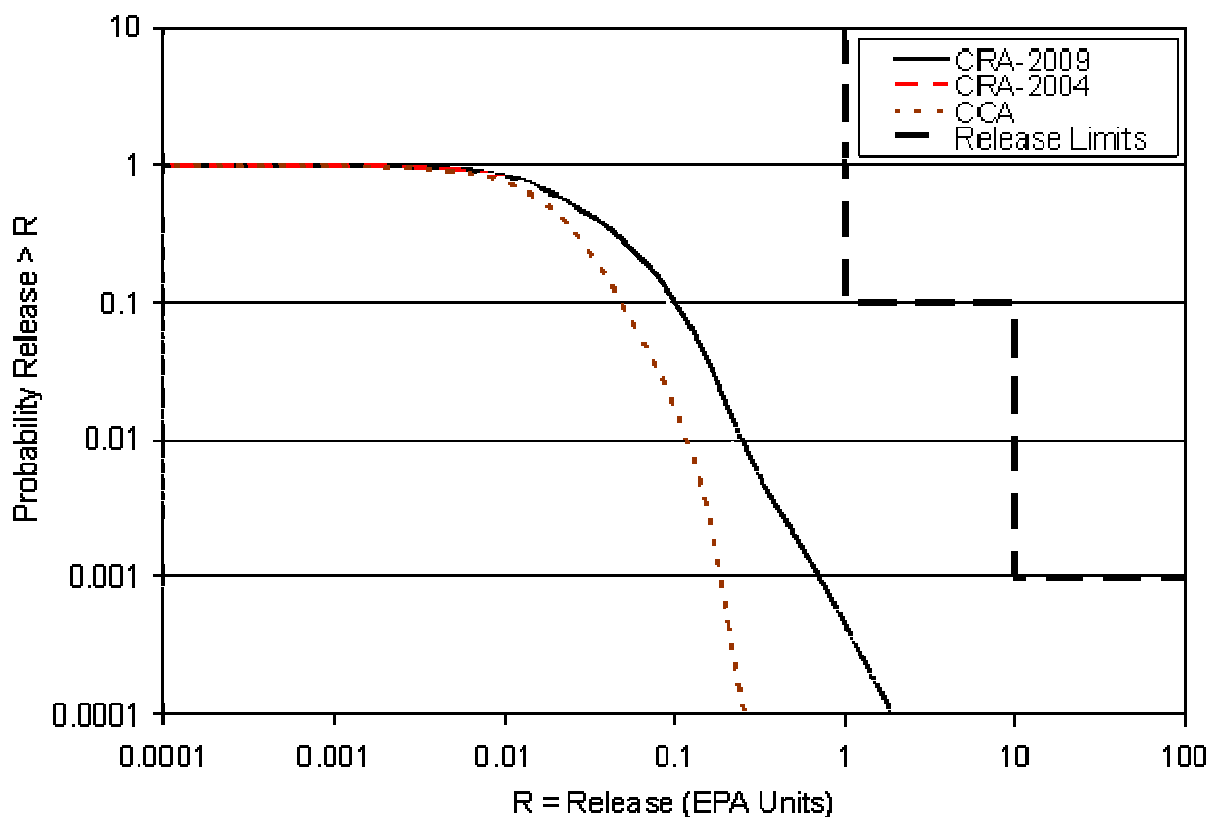


Fig 3 - Overall Mean Total Releases for the CCA, CRA-2004, and CRA-2009

POST-SUBMITTAL ACTIVITIES

Shortly after receipt of the CRA-2009, the EPA issued a Federal Register notice [9] that the application had been received, that the EPA would be reviewing the application to make a completeness determination and to provide the public with an opportunity to make comments. EPA also used a listserv to distribute similar information to members of the public. A “listserv” is an electronic mailing list software application consisting of a set of email addresses for a group in which the sender can send one email and it will reach a variety of people.

New Mexico stakeholders were also contacted about a face-to-face public meeting to share their comments with EPA and DOE. Based on the format of CRA-2004 public meetings, stakeholders proposed a roundtable arrangement by which EPA, DOE and stakeholders sit around a common table to present and discuss comments. In addition, the DOE generated several fact sheets on a number of topics related to the CRA and of interest to the public and made them available as handouts during the meeting.

The public meeting was held in June 2009 in Albuquerque, NM. It opened with the EPA and DOE making introductory remarks, followed by a presentation on how this application was reformatted and presentations on technical topics of interest to the public. Once the presentations were complete, the public had a chance to present their views and ask questions.

At this point, the tone of meeting changed from a friendly exchange to a verbal confrontation. What was intended to be an opportunity for the public to get a response from DOE and EPA experts on technical issues became an open, uncontrolled session for the public to express their opposition against WIPP and against any nuclear activity. EPA hired a meeting moderator to facilitate the exchanges with the public and to limit comments to only those topics relevant to the recertification. But after introducing EPA and DOE speakers and opening the meeting to public comment, the moderator became silent and did not facilitate or moderate the exchanges with the public.

Many of the public’s comments, such as those related to karsts in the Culebra and transportation, dealt with topics that have long ago been addressed and dismissed by the EPA as regulatorily insignificant. However, the issue of karst was a major focus for this meeting because it continues to be a concern for certain members of the public who do not find the DOE/EPA technical position to be credible. Other public comments were provided by two groups with a general anti-nuclear position. The Raging Grannies passed out song sheets and invited the audience to join them in singing anti-nuclear songs using existing music with new lyrics such as, “Take me out of the Bomb Game” and “Living in a Nuclear Waste Land”. A representative from the Citizen of the American Constitution for Nuclear Non-Proliferation read a 13-page letter that alleged DOE

management had violated the Constitution and included specific threats of personal liability and professional dismissal. The tension from the tone of verbal comments was so intense that several members of EPA and DOE felt their personal safety was at risk.

The EPA is continuing its completeness review process, which involves a comprehensive technical and regulatory compliance review with the regulations found at 40 CFR Part 194 [1]. EPA identified several areas where additional clarification was needed. As of November 2009, the EPA has sent the DOE three letters requesting feedback to 82 questions. The most significant request involves running a new PA using EPA requested revisions to parameter values. The DOE has also been asked to provide an impact assessment for the latest waste inventory changes.

CONCLUSION

Discussions between the DOE and the EPA about the content and format of the CRA due in 2009 began shortly after the 2004 recertification application was approved by EPA. Those discussions resulted in two major process improvements and a large number of minor changes. The first major improvement changed the format of the CRA to be consistent with the subsections of the 40 CFR Part 194 regulations. The second major improvement involved providing electronic hyperlinks from citations in the CRA to the relevant pages/paragraphs in a specific reference. These major improvements are intended to expedite the EPA's review of the recertification application by having consistent formats between the DOE's application and the EPA's Compliance Application Review Documents and by facilitating the process of finding and verifying reference materials that are relevant to the application.

The most recent CRA was submitted on March 24, 2009. The EPA is currently performing their completeness review, which includes three letters requesting additional information from the DOE. This information includes a request for a second PA as part of the completeness review. The EPA is also holding discussions with stakeholders the recertification process.

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