5.1.6 Design of Disposal System and Actions Taken to Ensure Compliance with Design Specifications

5.1.6.1 WIPP Facility

Page 5-11, lines 6-11: *Disposal system items and processes were designed using sound engineering practices, scientific principles, and applicable industry and government standards. System design descriptions, conceptual design reports, performance requirements, and regulatory requirements are included in new designs. Designs are initiated using a classification system that ensures that the proper level of design and QA requirements is employed to meet design and testing requirements.*

> The EEG and the EPA have both commented that many assertive statements in previous drafts of Chapter 5 were not substantiated. These are examples of such statements. The requirement is that the application should demonstrate that the design was established and executed under a QA program that adhered to the requirements of the NQA standards, not to merely restate those requirements. Chapter 5 contains many other such unsubstantiated statements (see, for example, most of section 3.1), so many that the EEG will desist from pointing them out--but the practice adds no substantive value to the application.
>
> Note that the initial sentence alone covers past development of designs. NQA-1 Basic Requirement 3, Design Control, begins:
>
> > The design shall be defined, controlled, and verified. Applicable design inputs shall be appropriately specified on a timely basis and correctly translated into design documents. Design interfaces shall be identified and controlled. Design adequacy shall be verified by persons other than those who designed the item.

The final sentences of the Chapter 5 statement is in the present tense. What QA documents show that the WIPP facility was initially designed according to the NQA standards? The documents should be properly referenced.

Page 5-11, lines 13-22: *NQA-1 Supplement 3S-1 requires that design verification be performed...Design verification was accomplished by a combination of Supplement 3S-1 methods.*

> Again, this is an assertive statement which is unsupported by evidence. A reference to the document which shows that Supplement 3S-1 methods were used to verify the WIPP facility design should be referenced.

5.1.6.2 Original Repository Design

Page 5-11, lines 26-31: *After Bechtel turned systems over to the DOE, an extensive and comprehensive program of start-up testing was initiated by the DOE. The program tested systems and components against the requirements specified in design documents. This testing*

meets the requirements of Supplement 35-1 for design verification.

The design documents and start-up testing documents should be referenced. The §194 requirement is to demonstrate that the activities described in these statements were performed, not to describe them.

Page 5-11, lines 33-38: *Brookhaven National Laboratory performed independent calculations of important design parameters...This task was documented in a report commissioned by the Office of Environmental Safety and Health (EH-30) titled, "Waste Isolation Pilot Plant Safety Evaluation Report" dated August 1989, including two subsequent addenda, the last of which closed all action items, concluding the Brookhaven effort.*

The report (referred to hereafter as the 1989 SER) is not listed in either the "References" or "Bibliography" sections at the end of the chapter, though a memorandum which apparently describes the report is. The document is dated July 27, 1989, not August. The document and addenda (Supplements) should have been properly referenced in the bibliography.

The purpose of the report was to independently document the completeness and adequacy of the Final Safety Analysis Report (FSAR) on WIPP that was current at that time (December 1988 version). The 1989 SER was only for the now-discarded "test phase" which had a 5-year lifespan rather than the 10,000 year requirements in §194, and notes that the 1989 FSAR did not include remote-handled waste (RH-TRU) in its considerations. The 1989 SER does, however, state that the review addresses the adequacy of design for the lifetime of ground structures and site characterization.

The 1989 SER also contains the following statement (p. 11-3 and 11-4):

> A Quality Assurance issue...was the failure to adequately transfer knowledge of facility design bases (Ref 13) to either DOE or the operating contractor. DOE and operating contractor staff engineer(s) were not fully knowledgeable of the details of the WIPP designs, the design calculations, specifications and drawings (as-built, ship, etc.). It is therefore unlikely that issues pertaining to the design bases, design calculations, structures, etc., and related quality control can be adequately addressed.

This is related to a concern expressed in an EH-30 Request for Additional Information, which stated that

> The FSAR states that construction management documents...are available at the WIPP Facility. Based on our efforts to collect information from the site, this is a gross misstatement of the facts. Documents are not generally available nor are they organized in any fashion which lends itself to review and/or audit...Any attempt to assess as-built conditions are clearly frustrated by such a situation. [SER Appendix B, Response to DOE/EH Request for Additional Information: Chapter 3, May 3, 1989, p. 22; the DOE's response was to simply note

that these were program management documents, not construction records]

Supplement 1 to the 1989 SER ("Supplement 1 to Safety Evaluation Report for Waste Isolation Plant" dated 01/16/90, p. II-3) notes that the WIPP committed to completing the "as-built" drawings for critical systems in the facility on a schedule provided. A memorandum from M. R. Brown, Manager of Westinghouse Engineering & Repository Technology Support, to Richard J. Figlik, WIPP Project Office, dated May 5, 1989 (see Attachment IV), illustrates the extent of the process necessary for developing the "as-built" drawings: Attachment 1 to the memorandum is a list of prioritized "as-builts" to be reconstituted, which, among other items, includes the electrical system for both the surface and underground, the environmental monitoring system, the radiation monitoring system, the underground ventilation system, the confinement facilities, the shaft hoist systems, communication systems, fire protection systems, waste handling equipment, the central monitoring system, security systems, water systems, underground testing and testing equipment, and "General Civil and Standard Systems" (which would seem to be the non-specialized items such as the site support buildings).

In short, the original QA records for design were not collected, stored, or maintained as required by NQA-1 Supplement 3S-1.7, and had to be redone. Chapter 5 should reflect the true history of QA for the facility design.

Page 5-12, line 4: *See Section 5.3.1.8 for the location of applicable QA records [for WID design].*

Section 5.3.18 (p. 5-37) contains QA records location information (there is no section 5.3.1.8).

Page 5-12, lines 24-34: *The repository sealing system design....report [Appendix Seal] was extensively reviewed...audits and surveillances were performed on each of the primary contractors...The DOE performed oversight activities...of the SNL QA program as it relates to the SNL Sealing Systems Program...*

References to the specific audits and surveillances should have been included.

5.1.7 Collection of Data and Information to Support Compliance Application(s)

Page 5-14, line 17: *WID Activities: None.*

Data and information collected by WID is used throughout the CCA. Several chapters in the CCA reference the Site Environmental Reports for 1990 and 1992-1995, for example. Many of the appendices to the CCA are totally based on WID or WID subcontractor data. These include the Annual Site Environmental Report (Appendix SER); Appendix RPB, Statistical Summary of the Radiological Baseline Program for the WIPP, March, 1992; the Engineered Alternatives Cost/Benefit Study (Appendix EBS); Appendix EMP, the Environmental Monitoring Program (which wasn't mentioned as part of Environmental

Monitoring, section 5.1.2); Appendix GTMP, the geotechnical surveillance program; and Appendix GWMP, the groundwater monitoring program.

Organizations other than the DOE, SNL and WID are referenced in the CCA; for instance, Appendix HYDRO is written from US Geological Survey reports. The introduction to the Appendices (in the computerized version of the CCA) states that:

> Significant portions of the hydrological data in Chapter 2.0 are derived from this report.

Chapter 2 is Site Characterization, a major component of the CCA; and hydrological considerations are of major importance to compliance. This, too, is data and information used to support compliance, and demonstration of establishment and execution of a QA program that adheres to the NQA standards for the USGS data would seem to be a requirement of §194.22(a)(2)(vii)--though processing through the QED process allowed by §194.22(b) would seem to be a viable alternative.

5.1.8 Other Systems, Structures, Components, and Activities to the Containment of Waste in the Disposal System

Page 5-14, Lines 24-26: *At this time, the DOE has not identified any other systems, structures, components, or activities important to the waste isolation in the disposal system that require controls to be applied as described in the CAO QAPD.*

The process utilized for controlling drilling activities in the WIPP vicinity is an important activity for containment of waste with which the DOE has had problems in the past (see the "Passive Institutional Controls" section of EEG's March 14, 1997 letter to the EPA, in the WIPP docket for a pertinent example). QA oversight of this process could enhance the WIPP disposal system.

5.2 Program History

Page 5-15, Lines 1-19: *A QA program was established in late 1977 that was based on 10 CFR Part 50, Appendix B...By late 1978, DOE policy refinements had expanded the QA program to incorporate the requirements of...(ANSI)/ASME N45.2, and had extended the applicability...to all earth science activities furnishing information on the possibility of radionuclide release into the biosphere...in late 1979...The WIPP QA program was revised to meet the DOE/Albuquerque Operations Manual (Chapter WIPP), which was equivalent to the requirements of ANSI/ASME NQA-1-1979...Over the next 12 years, the WIPP QA program was revised to reflect the ...changes in upper tier QA program documents NQA-1-1979 to NQA-1-1989...*

The principle documents for the QA program(s) described, and the documents showing the changes, should be referenced. The DOE/AL Operations Manual should be included in the References/Bibliography at the end of the chapter.

The 1989 SER (FSAR review by DOE Headquarters EH-30; referenced above in comments

on p. 5-11, lines 33-38) found in late 1988 (p. II-2):

> (1) A lack of sufficient independence for the QA organization, (2) a lack of adherence to the intent of the ANSI/ASME NQA-1 Supplements, (3) a lack of an adequate design control program, (4) an inconsistent approach for the evaluation of "Important to Safety" items and services, (5) a lack of training, qualification and certification of audit, inspection, and test personnel and (6) no training and indoctrination programs.

The first attempts to address these were also woefully inadequate, indicating that basic knowledge of NQA-1 was not highly developed. The 1989 SER comments on WIPP's first response (from the 1989 SER, p. II-3):

> The requirements of ANSI/ASME NQA-1 were quoted but no description of how they would be implemented was provided. Although there was improvement in most areas, the Quality Assurance Program still lacked: (1) identification of the responsible Quality Assurance authority and its place in the WIPP Organization Structure, (2) interface requirement between the three major participants [DOE, SNL, WID], (3) responsible authority and commitment for a Training and Indoctrination Program, (4) specific commitments for review and approval of procurement documents, (5) a requirement for receipt inspection and the option of using source inspection to accept procured items or services, (6) the specifics for waste material receipt inspection at the site, (7) responsibilities for the processing and storage of radioactive materials, (8) test procedure requirements, (9) handling and storage requirements for radioactive waste materials, (10) responsibilities for nonconformance control, and (11) qualification and certification of audit personnel.

Given that these items reflect language from many NQA-1 requirements it seems likely that the application of NQA-1 was not a significant part of the WIPP QA program before the EH-30 evaluation took place. 10 CFR 50 Appendix B, cited as the basis for the 1977 origin of WIPP QA, contains similar requirements.

A June 1, 1989 memorandum from James P. Knight, Director of the DOE's Office of Safety Appraisals, to Richard W. Starostecki, on the subject "EH Oversight of the Waste Isolation Pilot Plant Project (WIPP)" (see App. V), adds other failures in the WIPP QA program to address NQA requirements (p.2):

> A fundamental management issue also remains at this time; the adequacy of the DOE Quality Assurance (QA) program for the WIPP project. As presently structured, neither the dedicated QA staff, one person designated as the QA Manager, nor the low reporting level of the QA program meet the ANSI/ASME, NQA requirements espoused by DOE orders.

The "one person designated as the QA Manager" was the entire WIPP Project Office QA staff at the time (Westinghouse apparently had the "dedicated QA staff" mentioned). Indirect evidence also points to a lack of QA during the period up to 1989. The "as-built" design problems addressed above (see comment to page 5-11, line 33-38) were apparently never addressed by the WIPP QA organizations. Jack B. Tillman, DOE's WIPP Project Manager in 1989, testified during the June 12, 1989 hearings of the U.S. House of Representatives Environment, Energy, and Natural Resources Subcommittee of the Committee on Government Operations that:

> The as-builts have been known as a deficiency since the Corps of Engineers left the site...

(Page 171 of the printed hearings; U.S. Government Printing Office, 1990.) However, there is no evidence that responsible QA organizations pursued remediation of that deficiency in the years after the Corps of Engineers left. Any auditing activity seeking objective evidence that NQA-1 Basic Requirement 3 had been met, in virtually any area at WIPP site during this time, would have rediscovered the deficiency. Chairman Synar of the subcommittee later indicated his view of the QA program (p. 333 of the printed hearings):

> ...without an adequate quality assurance program, Mr. Tillman, I think it is very unlikely that you are going to be able to ensure that the experiments are going to be run properly, that the appropriate data is collected, and that it is applied properly.

In 1989, it appears that reviewers did not find a WIPP QA program which met the requirements of the NQA standards. Chapter 5 should reflect a more accurate history of WIPP QA.

5.3. Adequacy

"Adequacy" is later defined (p. 5-39) as the flowdown of requirements contained in upper-tier documents into implementing procedures. The subsections under this heading seem to be arranged in accordance with the Basic Requirements of NQA-1, with NQA-2 Part 2.7 and those portions of NQA-3 not already covered added at the end. This format and intent should have been made explicit in the text.

Though arranged according to the NQA standards, the subsections do not describe how all of the requirements described in the Basic Requirements and Supplements are met. The matrices mentioned on page 5-1, which link NQA requirements to the principal QA documents for the major WIPP organizations, would seem to have been more effective (and concise) in demonstrating that the WIPP QA program documents contain the requirements of the NQA standards.

In several subsections implementing documents for SNL are described as "None", even though these are requirements of the NQA standards which are applicable to SNL operations. These

appear to reflect a lack of research in writing Chapter 5, rather than an absence of adequacy in the SNL QA program.

Page 5-16, lines 12-18: *From May 1993 to March 1994, DOE Headquarters...(EM-342) assessed the quality of the WIPP data acquisition process for performance assessment...The team concluded that the DOE needed to reevaluate all experimental program data used to support performance assessment.*

The EM-342 documents describing the assessment and its conclusions should be referenced.

Page 5-16, lines 20-42: *The adequacy of the current DOE QA program is ensured by passing down requirements...with the directive that applicable requirements then be passed down to lower tier organizations...Adequacy of QA program requirements are initially verified by the DOE through the review of lower-tier QA program documents prior to their implementation...Formal document review forms are used...*

QA documents that demonstrate this is being done should be referenced (the CAO QAPD in Appendix QAPD, Section 1.1.2.1 covers the majority of these requirements).

Page 5-21, Lines 1-8: *The DOE has also prepared matrices tracing the applicable NQA requirements referenced in Section 5.1 to the CAO QAPD. WID and SNL likewise are required to prepare and maintain matrices...the matrices are designated [sic] to demonstrate that the DOE, SNL, and WID QA programs are adequate and address all applicable requirements.*

Including the matrices could have been a major step in demonstrating adherence to a QA program that implements the requirements of the NQA standards, as required by 40 CFR 194.22(a)(1). These matrices would also provide substantiation for many of the assertive statements that currently lack substantiation (see comment addressing page 5-11, lines 6-11).

Page 5-21, lines 10-11: *The DOE, SNL, and WID perform assessments that include the review of implementing documents for adequacy.*

The source document(s) for this requirement should be properly referenced.

5.3.3.1 Grading

Page 5-25, line 19-21: *WID Implementing Document: WP13-QA3501 Graded Approach*

The EEG controlled copy of the WID QA procedures shows that this document was removed from the WID Quality Assurance Manual on September 27, 1996, a month before the CCA was issued. The controlled copy change notice does not indicate any replacement document. At the EPA audit of WID in February, 1997, WP13.03 Revision 0, Quality and Regulatory Assurance Department Assessment Program, effective August 26, 1996, was identified as the current implementation of the WID grading process (Section 7.3.1,

"Activity Grading Process").

5.3.3.2 QA Program Documents (p. 5-25)

This section does not include SNL QA program documents. The CAG expectation (p. 18) is that DOE principle contractor top tier QA documents would be included in the CCA, not merely listed.

5.3.3.3 Qualification and Training

Page 5-26, line 2: *Personnel performing work are qualified and capable of performing their assigned tasks.*

Personnel are required to be qualified and capable—that does not mean personnel will always be so. It hasn't been in the past. for example, an SNL surveillance in November, 1995 discovered that only 2 of 30 personnel in the FEPs program had fulfilled the training requirements.

Similar overstatements, wherein a QA program requirement is described as if absolute compliance with the requirement is a certainty, are made throughout Section 5.3 subsections. These are logical fallacies for which countering examples can nearly always be found (see comment to the following section, 5.3.3.4, for another example). Such statements are usually so self-evidently overdone that most are only a minor distraction, and will not be individually pointed out.

Many of these statements also should provide a specific reference to the section(s) of WIPP QA document(s) that establishes the requirement. These will also not be individually pointed out--but assertions should always be backed by objective evidence or a path to the objective evidence.

5.3.3.4 Management Assessments

Page 5-26, lines 28-30: *Management personnel...perform assessments of the portions of the program for which they are responsible to assist in ensuring effective implementation of QA requirements.*

The CAO Manager had yet to perform an assessment of CAO at the time the CCA was published (one is scheduled for February 24-28, 1997). The NQA-1 requirement (Basic Requirement 2, last paragraph) is that management "...shall regularly assess the adequacy of the program for which they are responsible...". SNL's last WIPP Project Management Assessment (previous to the October 1996 publication of the CCA) was June 12, 1995. Corrective Action Reports on management assessments have been initiated at both CAO and SNL.

Pages 5-17 to 5-32, Sections 5.3.4 Design Control...5.3.5 Procurement Document Control...5.3.6 Instructions, Procedures and Drawings...5.3.7 Document Control...5.3.8

control of Purchased Items and Services...5.3.9 Identification and Control of Items...5.3.10 Control of Processes... No significant additional comments, though these sections do not necessarily address all the NQA-1 requirements for the area specified. For instance, section 5.3.4, Design Control, does not show how design inputs are identified, documented, reviewed, and approved, as required by NQA-1 Supplement 3S-1 2. Editorial note: page 5-30, line 31. "WP 13-QA10003" should be "WP 13-QA 1003".

5.3.11 Inspection

Page 5-32, lines 6-22: *Inspections determine acceptance or rejection of a process, product, or service. Inspection documentation for DOE participants includes the following: approved implementing procedures...DOE Implementing Documents: None SNL Implementing Documents: None*

> The CAO QAPD, Rev. 1 requires that inspections be performed in accordance with approved implementing procedures (Section 2.4.1). This section implies that SNL does not have the procedure required by the CAO QAPD for conducting inspections. It further implies that there are no documents controlling SNL's inspection activities at all.

5.3.12 Test Control

Page 5-32 line 32 to Page 5-33 line 16: *...Test included as part of scientific investigations are conducted in accordance with the QA methods described in Section 5.3.21...SNL Implementing Documents: None*

> Apparently all SNL tests are considered to be scientific investigations, covered by the procedures listed in Section 5.3.21. This should have been made explicit in the text, as the sense of the text in this section is that SNL has no implementing documents for control of testing.

Page 5-33 line 20: *WID Implementing Documents: WP 03-001 Preparation, Release, and Cancellation of Start-up Test Procedures*

> While this is not particularly a CCA concern, the document has not been changed since August 21, 1992, and the last periodic review noted in EEG's controlled copy was August 12, 1993. Page 4-5 of the document requires control and startup QA records to be processed in accordance with WP 13-6, a procedure removed from service before September 27, 1996.

5.3.14 Handling, Storage, and Shipping

Page 5-34, lines 21-37: *Items...are handled, stored, and shipped using approved and documented methods...SNL Implementing Documents: None*

> NQA-1 Supplement 13S-1.2 requires that these processes are to be "...conducted in accordance with established work and inspection instructions...or other pertinent documents

or procedures specified for use in conducting the activity." This section implies that SNL has no such documents or procedures.

5.3.15 Inspection, Test, and Operating Status

Page 5-35, lines 5-7: *The specific status indicators, their use, and the authority to apply or remove them are delineated in applicable QA plans or implementing procedures...SNL Implementing Documents: None*

The implication is that SNL has no internal documents requiring compliance with NQA-1 Basic Requirement 14, Inspection, Test, and Operating Status.

5.3.16 Control of Nonconforming Items

Page 5-35, line 30 to page 36, line 13: *...When appropriate, further work on the item is halted by senior management until the appropriate actions have been taken and verified. The nonconformance control process is documented in applicable QA plans or implementing procedures...WID Implementing Document: WP13-007, Hold Tag Issuance*

In this section, neither SNL or DOE implementing documents are specified. SNL does have at least one procedure that would seem to apply to the discussion in this section (QAP 2-5, "Issuing and Lifting Stop Work Orders"); WID, too, has a "Stop Work" procedure that would also seem to apply (WP13-008).

The CAO QAPD, Rev. 1, Section 1.3.2.3.D. requires that disposition of nonconforming items, and the responsibility and authority for evaluation and disposition, be defined in QA documents (plans or procedures). The NQA-1 requirement (Supplement 15-S1.4.1) is:

> Nonconforming characteristics shall be reviewed and recommended dispositions of nonconforming items shall be proposed and approved in accordance with documented procedures.

Procedures covering the discussion of nonconforming items should have been listed.

5.3.17 Corrective Actions

Page 5-36, lines 21-23: *A significant condition adverse to quality is defined as a condition that, if not corrected, could have a serious effect on compliance with 40 CFR Parts 191 and 194.*

A statement that compliance with the EPA disposal regulations is the only defining factor for a significant condition adverse to quality is exceptionally disconcerting. This definition is simply unacceptable--A WIPP QA program utilizing such a definition would likely be unacceptable. Fortunately, the CAO QAPD, Rev 1, offers an infinitely better definition which is in use by WIPP QA (Section 1.3.2.1, p. 1-16):

> Significant conditions adverse to quality are conditions that if not corrected,

could have a serious effect on safety, operability, waste isolation, compliance, or the reliability of the QA program.

The difference between chapter 5 and the QAPD definitions of what constitutes a significant condition adverse to quality is evidence both of poor writing and inadequate review of chapter 5.

Page 5-37, lines 8-9: *Minor software problems are documented by software problem reports or other resolution mechanisms as discussed in Section 5.3.20.*

No specific mention is made of software problem reports or other resolution mechanisms in Section 5.3.20; the closest statement is (p. 5-41, lines 25-26):

> For released versions, software problems are documented, evaluated, and, if appropriate, corrected.

This seems far short of the "discussion" indicated.

Page 5-37, lines 9-10: *If a software problem is determined to be a condition adverse to quality, it is documented and resolved as described in this section.*

The difference between a minor software problem, which may or may not be corrected, and a condition adverse to quality in software, for which the corrective action process must be followed, is not explained. The term "condition adverse to quality" is not defined, though "significant conditions adverse to quality" is.

5.3.18 QA Records

Page 5-37, line 36, to Page 5-38, line 6: *The records management process includes provisions for...classifying QA records as either lifetime, nonpermanent, or postclosure...*

Classification of the many unique records generated by the WIPP has yet to be accomplished, as the DOE must submit suggestions to NARA (National Archives and Records Administration) on classification of WIPP records and await NARA's guidance. The NARA positions could take some years to obtain. The provisions are in place, but many of the QA records have not been classified yet. This should have been explained in the CCA.

Page 5-38, lines 17-22: *These [QA] records are maintained by the proper organization for approved disposition. DOE QA records are retained in the document services storage facility in Carlsbad, New Mexico. SNL QA records are retained in the SNL WIPP Central Files located in Albuquerque, New Mexico, and Carlsbad. WID QA records are retained in the WID WIPP Files located in Carlsbad. Generator site QA records are retained in NQA-1 storage facilities at each site.*

Essential records are still at several subcontractor sites other than those mentioned. For

instance, records related to microbial degradation of the waste were at Brookhaven National Laboratories in early February, 1997, four months after the CCA was published.

5.3.19 Audits and Surveillances

Page 5-39, lines 15-16: *The management and control of audits and surveillances are documented in QA plans or implementing procedures.*

The "implementing documents" sections for this section list procedures, but no QA plans are cited.

5.3.20 Computer Software QA

Page 5-40, lines 10-12: *Plans are prepared at the start of the software life cycle to document the software basis and objectives of the software to meet its intended use.*

This description (however it may be interpreted) falls short of describing the necessary "requirements phase" documentation specified by NQA-2 Part 2.7 sections 3.1 and 6.2. These sections require that in the requirements phase that software functionality, performance, design constraints, attributes, and external interfaces shall be specified documented, and reviewed, that the software response to anticipated classes of input data shall be defined. Section 3.1 also requires that verification and validation plans are to be written. The CAO QAPD Revision 1 (in Appendix QAPD) does contain what seems to be an adequate description of the process, and could have easily been referenced.

Page 5-40, lines 15-17: *Any software errors and failures are reported to the sponsoring organization for analysis and then forwarded to the supplier, if applicable.*

NQA-2 Part 2.7 Section 10.1 states that not only will the supplier report software errors or failures to the purchaser, but "...the purchaser shall report software errors to the supplier." No mention of determination of applicability by the purchaser is to be found in NQA-2 Part 2.7--the reporting of software errors and failures to the supplier must always be performed.

Page 5-41, lines 25-26: *For released versions, software problems are documented, evaluated, and, if appropriate, corrected.*

When would correction of software problems not be appropriate? NQA-2 Part 2.7 Section 8 does, however, have similar language:

> Corrective action by the responsible organization shall assure that: (a) problems are identified, evaluated, documented, and, if required, corrected...

Software problems that do not require correction should not be considered problems.

Page 5-41, lines 39-42: *WID Implementing Documents... WP 16-117, WIPP Computer Software*

The comment to Page 5-10, lines 20-23 was that this document was replaced by WP16-IT3117, Revision 0, same title, on 9/26/96, a month before publication of the CCA.

5.3.21 Scientific Investigations

Page 5-42 line 4-6: *Process variables affecting scientific investigations are measured and controlled as described in Section 5.3.13.*

The section referenced is "Control of Measuring and Test Equipment". Process variables other than equipment can affect scientific investigations.

Page 5-42, lines 31-32: *Scientific investigations are performed according to requirements documented in scientific notebooks or technical implementation documents or both.*

The statement reverses the order found in Section 5.2.A of the CAO QAPD Rev 1 (p. 5-2):

> Scientific investigations shall be performed in accordance with requirements documented in test plans, procedures, and scientific notebooks.

Test plans and procedures go through a series of required reviews, a comment resolution process, and approvals before promulgation; it is hard to imagine that requirements listed in scientific notebooks would undergo anywhere near the same scrutiny.

The problem of using scientific notebooks as a requirements document has cropped up at SNL in the past, when scientific investigations were in process (sometimes completed) before test plans or procedures governing the operation had finished the review and comment process. When QA assessments uncovered the deficiency the response has been that daily communications documented by entries in scientific notebooks were thought to be sufficient. If comments have yet to be resolved and approvals haven't been granted, how can the daily communications recorded in the notebooks reflect the yet-to-be-determined requirements?

If the result of the CAO QAPD statement quoted above is to allow scientific notebooks to be used as described at SNL, the CAO QAPD may have failed to fulfill Basic Requirement 2 of NQA-1. This requirement states in part that the documented quality assurance program

> ...shall provide for the planning and accomplishment of activities affecting quality under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied. [emphasis added]

Scientific notebooks are a record of thoughts, processes, data, and results from within a scientific investigation. Planning documents establishing requirements for the investigation should be completed before the work begins. Use of scientific notebooks should not be a circumvention of the responsibility to plan, review, and authorize requirement documents for scientific investigations.

Since SNL is responsible for the bulk of scientific investigations for WIPP matters, it is worth noting that SNL QA Procedure (QAP) 20-2, Preparing, Reviewing, and Approving Scientific Notebooks, requires as the first step in the process (Section 4.1, Step 1, p. 5) that the principal investigator

> Ensure that planning is documented in an approved Test Plan according to QAP 20-1 or an approved TOP [Technical Operating Procedure]...

QAP 20-1, Preparing Reviewing, and Approving Test Plans, dictates that requirements are to be addressed in test plans (Appendix A, p.11).

Page 5-43, lines 1-2: *Uncertainty limits are assigned to the data prior to their use.*

Uncertainty limits should be derived from statistical interpretation of the data, rather than assigned (this may be simply poor word choice).

Page 5-43, line 34: *WID Implementing Documents: None*

WID performs scientific investigations (under any rational definition of the term WID's environmental monitoring program qualifies), and undoubtedly has implementing documents in the form of plans and procedures which should have been listed here.

5.3.21.1 Data Quality Characteristics

Page 5-43, line 38-40: *40 CFR § 194.22(c) states that to the extent practicable, data used to support compliance will be assessed according to their accuracy, precision, representativeness, completeness, and comparability.*

This is a misinterpretation of 40 CFR 194.22(c)]. The requirement is as follows:

> Any compliance application shall provide, to the extent practicable, information which describes how all data used to support the compliance application have been assessed for their quality characteristics, including...[the PARCC characteristics (precision, accuracy, representativeness, completeness, and comparability)]

The requirement does not state that the data must be assessed the PARCC characteristics, only that the CCA include a description of how the assessment was performed. It is also important to note that the requirement does not limit the DOE to only considering the PARCC characteristics--the DOE could also take the opportunity to describe how other

quality characteristics of the data were assessed.

Page 5-43, line 39 to page 5-44, line 2: *The DOE believes that these data quality characteristics are applicable to tasks involving the quantification through sampling and analysis of specific constituents of an environmental medium. The DOE also believes that these requirements are intended to address activities such as the determination of the presence or absence of pollutants in waste streams. Waste characterization and environmental monitoring are examples of the types of activities at the WIPP in which data quality characteristics apply. In these cases the performance measurement is the concentration of the constituent of interest.*

The DOE agrees that waste characterization and environmental monitoring activities could be assessed using the PARCC characteristics, but no description of how data from these areas were assessed is included in this section, chapter 5, or elsewhere in the CCA.

Page 5-44, lines 4-12: *In performance assessments...the performance measure is cumulative release of radionuclides to the accessible environment over the next 10,000 years. This measure is estimated using mathematical models rather than being determined by direct measurement. The performance assessment process requires the use of mathematical models for the repository, which, in general, require that numbers (here called parameters) be assigned to geologic formation and waste properties. Since many of these parameters are not amenable to direct measurement, they must be treated as uncertain variables, rather than precisely determined quantities, and characterized by probability distributions.*

There seems to be a logical jump at the beginning of this paragraph that is not warranted. The ultimate performance measurement for PA is compared with an interim performance measurement for environmental monitoring. The ultimate performance measure for environmental monitoring is determination that radionuclides have, or have not, been released, just as it is for PA; concentration values are an interim step to that measurement, just as many parameter values are for PA (the difference is, of course, that environmental monitoring results are real while PA is a projection). Other parameter values, those "not amenable to direct measurement", should be based on data measurements to which PARCC characteristics could be applied. Finally, the PARCC characteristics do not need to be applied only to "precisely determined quantities"; for example, the completeness figure for a difficult process could be 10%, and the accuracy set to 300%. The requirement is to show how the values were assessed, not to require that narrow limits be put on the measurements.

The PARCC characteristics are a method for establishing the validity of the measurement—but that is a scientific usage, not a QA function. The §194.22(c) QA requirement is that the CCA should contain information which describes how the PARCC characteristics were assessed.

Page 5-44, lines 14-21: *Data are used to develop conceptual models for disposal system performance that are implemented as computational models in the performance assessment. Data are also used to support distributions for parameter values used in computational models. Between the point of data collection and the final computational model, uncertainty is introduced*

(for example, experimental design, extrapolation of the experimental results to spatial or temporal scales, etc.). These parameter distributions may span several orders of magnitude, and many parameters derived from data measurements need be known only within orders of magnitude of their true value. Efforts to reduce the range do not necessarily improve the model accuracy.

The requirement is for the data, not for the computational modeling use of it. If the low-level data, based on measurements, have not been assessed for their quality, how much assurance can there be that the parameter distributions based on it are a measure of reality? An original measurement that represents a sample three orders of magnitude from the mean of the population is not much improved by establishing a three orders of magnitude range. The last sentence implies again that the PARCC characteristics are a requirement to reduce the range; they aren't. The PARCC characteristics help establish what sort of range should be used. This relates to the confidence which can be placed on the model accuracy, not the accuracy itself.

Page 5-44, lines 31-26: *Uncertainty and sensitivity analyses respectively assess the uncertainty in system performance measures and identify modeling areas and parameters in which reductions in uncertainty can increase confidence. If the uncertainty of a parameter is of significant importance to the performance of the WIPP, more data could possibly be collected to reduce uncertainty.*

This paragraph doesn't address the requirement at all. PARCC characteristics are not intended to reduce uncertainty, but to establish the quality of whatever uncertainties are used. The requirement is to ensure that an attempt has been made to address the uncertainty at the experimental data level. Uncertainty and sensitivity analyses at SNL determine the most important parameters, but it is the level of confidence in the underlying data for parameters that the application of quality characteristics is meant to establish.

Page 5-44, lines 33-38: *Instead of the above quality characteristics, other steps ensure that data are of adequate quality. Upper-tier quality requirements documents specifically define QA requirements for the collection of scientific and technical information. Section 5 of the CAO QAPD, Scientific Investigation Requirements, identifies the current requirements for data collection. For inclusion in compliance calculations, the data must be collected under an approved QA plan or otherwise be qualified.*

§194.22(a) covers the requirement for the QA program described; §194.22(c) seems clearly to be a requirement independent, and additional, to that established for the overall QA program.

Page 5-44, lines 40-43: *In summary, it is not practicable to apply data quality characteristics to most scientific investigations used to support a performance assessment in which there is uncertainty in the conceptual models and the resultant ranges of parameters. Instead, controls established by the QA program provide the necessary quality.*

The section fails to supply the required PARCC information for those scientific

investigations which this summary admits are not covered by the arguments.

It is likely that some, if not most, of the underlying scientific investigations used in PA had some sort of evaluation related to quality characteristics applied to it. The PARCC characteristics in particular have been established scientific quality attributes for many years. Some of evaluations may have even been clearly prescribed and documented. Retrieval of this data would be an enormous task, and even when retrieved would not be likely to show a consistent method of application. It may be that it is not practicable to supply information in the CCA as to how the PARCC characteristics were applied to all the data used in the CCA--but the arguments used in this section of Chapter 5 are not persuasive.

The arguments presented in this section are concerned solely with the PARCC characteristics. The DOE has provided no information as to how any quality characteristics were assessed for data, at any level. It may not be practicable to always assess the PARCC characteristics, but different quality characteristics for data used in the CCA could have been defined and assessed, and information concerning these assessments could have been included in the CCA.

5.4 Implementation

This section is for the most part a well-written and accurate description of the proactive and effective WIPP QA program the EEG has observed in recent years. Many of the comments that follow are editorial in nature--but there are still significant deviations from easily discoverable facts.

5.4.1 DOE QA Program Implementation

Page 5-45, lines 26-31: *The most recent audit of DOE/CAO...concluded that the DOE/CAO QA Program was adequate and effective, but not completely implemented. They cited noninplementation of two DOE procedures...These procedures are now fully implemented and the overall DOE QA Program is effectively implemented.*

Reference to the documentation of the acceptance by the auditors that the program is now considered to be effectively implemented should be included.

5.4.2 SNL QA Program Implementation

5.4.2.1 Data Qualification

Page 5-48 line 41 to page 5-49 line 6: *An SNL audit Internal Audit [IA] 95-03...was conducted in August 1995 to verify the adequacy and effective implementation of QA requirements...All the resulting corrective actions have been completed and verified...The audit concluded that...SNL QA controls were in place and that they were adequate and effectively implemented.*

This paragraph begins the section on data qualification, and appears as a *non sequitur* in

that it doesn't seem to relate to the title. It is not until the succeeding paragraphs define what "data qualification" is that a possible clue to the applicability of the paragraph may be deduced: this audit may have established the time after which SNL's data can be said to have been developed under the NQA standards. This interpretation can only be tentatively made. The reason for including the paragraph should have been made explicit.

Page 5-49, lines 8-16: *Data can be qualified for use by one of five methods...(2) existing data collected before the implementation of a qualified QA program are qualified by showing that the data were obtained under a QA program that is equivalent to one satisfying the NQA requirements referenced in Section 5.1...*

In the Independent Review Team (IRT) process, the entire QA program did not need to be equivalent to one which satisfied the NQA requirements. Only those portions applicable to the data being qualified needed to be equivalent to NQA requirements. The difference is important, in that none of the data qualified by IRT processes was collected under a fully NQA equivalent program.

Page 5-50, lines 1-2: *...collected after August 1, 1995 when SNL QA program was qualified by the DOE (Method 1).*

The DOE document establishing the qualification should be referenced.

5.4.2.2 Qualification of Existing Data

Page 5-51, lines 13-14: *All data sets not qualified by IRT or collected under a qualified QA program were qualified by the peer review process.*

Only those data sets used in the CCA were qualified. About 30 data packages failed the IRT process but were not sent to peer review.

5.4.2.3 T=0 Process

Page 5-51, Lines 30-31: *The process [T=0 for subcontractors to SNL] is documented in SNL procedure QAP 20-7.* Establishing T=0 for Internal and External Experiment Activity QA Programs, *and includes the following key elements...*

Revision 0 of QAP 20-7 has an effective date of November 20, 1996, nearly a month after the CCA was published. The process used may be documented in the procedure, but an approved version of QAP 20-7 was obviously not available at the time the T=0 determinations for the subcontractors listed in Table 5-6 were made. The process of determining T=0 is a quality-affecting one, and should have been controlled by procedures or instructions as required by NQA-1, Basic Requirement 9 and Supplement 9S-1.2, and the CAO QAPD Section 2.1.A--that is, the SNL document(s) that controlled and authorized the process at the time the subcontractor T=0 determinations were made should have been cited, not QAP 20-7.

5.4.3 WID QA Program Implementation

Page 5-52, lines 36-40: *WID determines the adequacy of the implementation of QA requirements for both internal WID customers and external contractors. Internal determinations of adequacy of QA implementation are generally based on adherence to the WID QAPD requirements. The process includes a review of the contractor's QA program with regard to the applicable element of the WID QAPD, nationally recognized codes and standards, and regulations.*

The term "internal customer" is not a commonly understood term, and should have been defined.

The transition from internal QA to external contractor QA between the second and third sentences is not explicit.

Page 5-52, lines 40-43: *The WID has performed audits and surveillances to determine the dates when each of its supplier's and subcontractor's QA programs were considered adequate and effectively implemented. These dates and the basis for determination are shown in Table 5-10.*

This is the "T=0" process which was more carefully described for SNL in Section 5.4.2.3. The controlling instructions or procedures for this process required by NQA-1, Basic Requirement 9 and Supplement 9S-1.2, and the CAO QAPD Section 2.1.A, should have been cited.

List of Attachments

I. July 22, 1996 letter from R. H. Neill, EEG, to George Dials, DOE (Referenced on page 2 of this review.

II. Undated letter (received by the EEG on August 9, 1996), from G. Dials, DOE, to R. H. Neill, EEG (Referenced on page 2 of this review).

III. August 20, 1996 memorandum from B. Walker, EEG, to R. H. Neill, EEG (Referenced on page 16 of this review).

IV. May 5, 1989 memorandum from M. R. Brown, WID, to R. J. Figlik, WPO/DOE (Referenced on page 21 of this review).

V. June 1, 1989 memorandum from J. P. Knight, DOE, to R. W. Starostecki, DOE (Referenced on page 23 of this review).

Attachment I to EEG Review
of CCA, Chapter 5

ENVIRONMENTAL EVALUATION GROUP

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

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July 22, 1996

Mr. George Dials, Manager
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Carlsbad, NM 88221-3090

Dear Mr. Dials:

Attached is the EEG review of Chapter 5, "Quality Assurance," from the WIPP Compliance Certification Application (CCA), published as DOE/CAO-96-2056 on May 31, 1996. Chapter 5 contains significant omissions and errors, and does not appear to meet the QA requirements listed in 40 CFR 194 or the expectations for QA as listed in the Compliance Application Guidance (CAG; EPA 402-R-95-014).

While the EPA has agreed to review the CCA a chapter at a time, the expectation was that each chapter would be a final version that would illustrate the DOE's best explanation of how the regulatory requirements for the areas covered by that chapter have been met. Chapter 5 contains many "placeholders", which are apparently to be replaced by data and analyses which have yet to be generated. Two appendices are referenced which were not included; the included Appendix RE-5 is apparently not referenced by the chapter, and is either incomplete or unnecessary. The EEG cannot provide a complete review until the additional information is added to the chapter package.

Chapter 5 also fails to meet the QA expectations listed in the CAG under the heading "§194.22 Quality Assurance" (page 18). The EPA clearly states on page 1 of the CAG that these expectations will be the criteria by which the completeness of the application will be judged, and that no further actions will be taken until the expectations are included. EEG could only verify that one of the first five expectations was included in Chapter 5. Unless it is the DOE's intention to meet the CAG QA expectations elsewhere in the CCA then Chapter 5 is also deficient in this regard.

For the most part Chapter 5 also fails to respond to the EPA comments on the Draft Compliance Certification Application (DCCA), as transmitted to your office on October 31, 1995 and January 30, 1996, and to some extent fails to address the comments published in

EEG-61, "Review of the WIPP Draft Application to Show Compliance with the EPA Transuranic Waste Disposal Standards" (March, 1996) concerning the DCCA QA Chapter. Chapter 5 contains editorial and technical difficulties which could delay the EEG and the EPA review of the complete application. A listing of some of these, as well as additional commentary on the "placeholders", CAG expectations, and other issues, can be found attached to this letter.

There is no indication in Chapter 5 that objective criteria are applied when audit teams determine the effectiveness of QA program adequacy and implementation. The process by which program effectiveness is determined should be described in Chapter 5.

Chapter 5 appears to be substantially incomplete. EEG recommends that the DOE withdraw the Chapter 5 submission, and resubmit it after (1) data to be included has been collected and analyzed, (2) the document has been rewritten to conform to CAG and other EPA expectations, and (3) full editorial and technical reviews of the contents by cognizant personnel have been performed.

Sincerely,

Robert H. Neill
Director

RHN:BAW:ss
Enclosure

ENVIRONMENTAL EVALUATION GROUP REVIEW OF CHAPTER 5 OF WIPP COMPLIANCE APPLICATION (DOE/CAO-96-2056)

Chapter 5 of the CCA, "Quality Assurance", published as DOE/CAO-96-2056, is an incomplete document which fails to adequately support compliance with the 40 CFR 194.22 QA requirements and the expectations for QA in the Compliance Application Guidance (CAG). This issuance of Chapter 5 appears to have been premature; material is missing, adequate technical and editorial review were apparently not performed, and there seems to have been no attempt to compare its contents against the EPA's criteria for completeness, or comments on the DCCA version of the chapter.

The following commentary is not a line-by-line review of Chapter 5, as the document is incomplete, and more general concerns should be addressed before such a review could be considered useful. Examples are randomly selected, to show the types of corrections necessary rather than a complete list of them.

Chapter 5 is an incomplete draft.

Chapter 5 as received by EEG on June 6, 1996, is a draft that would have been more appropriate in the DCCA. The document must be considered a draft, rather than a submittable document for compliance, as information has been replaced by "placeholders". The first page (5-1) has the following statement in the middle of a paragraph:

> This program of audits and surveillances assesses the adequacy and effectiveness of implementation of the individual QA programs. **[Placeholder for conclusions concerning the adequacy and effectiveness of implementation of the CAO and SNL QA programs].** (Emphasis in the original)

There are many such placeholder statements to be found in the document. Page 5-16 has one, page 5-42 has two, page 5-43 has one, 5-44 has two, 5-46 has two, 5-47 one, 5-50 three, and there may be others. The apparent reason for many of the placeholder statements is that QA activities necessary for production of a QA chapter in the CCA have not yet been completed and adequately analyzed. The placeholder quoted above, for instance, probably is due to external audits which had been scheduled, but not completed, of SNL (performed in May and June 1996) and CAO (scheduled for July 15-19, 1996) prior to the writing of Chapter 5. Other placeholders (on p. 5-46 and 5-47) are related to peer review qualification of data; these peer reviews are still in progress.

The results of these QA activities may not always support the conclusions already drawn in Chapter 5. The effectiveness of SNL's QA program was recently adjudged as "marginal" by a CAO-contracted audit, and if the DOE intends to use the results of the audit in the CCA

then some sort of updating activity should be performed to show that the program is adequate.

Note that neither WID nor any of the generator sites were included in the placeholder statement quoted above. Adequacy and effectiveness of QA at these sites, too, was yet to be established at the time of publication of the document, though major audits of INEL (effective, except for ineffective ANL-West) and Rocky Flats (marginal) were performed in late 1995.

In addition to "placeholder" statements, other information to be used for compliance is yet to be obtained. For example (from p. 5-3 and 5-4, Section 5.1.1):

> The TWBIR was prepared in compliance with the CAO QAPD and was audited by CAO QA on September 5 and 6, 1996.

Since the EEG is reviewing Chapter 5 in June, 1996, it is not meaningful to take credit for an audit in September, 1996. The version of the TWBIR to be audited hasn't been published yet, either; and the version of the CAO QAPD with which it apparently is to comply was not officially transmitted to TRU-waste personnel (or EEG) until after Chapter 5 was received (distribution memo dated June 13, 1996, from CAO's QA Manager).

Until the evidence to be used in Chapter 5 has been appropriately gathered and properly analyzed, the chapter can only be considered an incomplete draft.

Chapter 5 was not adequately reviewed by the DOE.

In the above quotation, the applicable version of the CAO QAPD is not listed, nor is the version number of the TWBIR. Document version numbers are not to be found for most (if not all) documents in the chapter, which makes verification of many statements impossible.

Other editorial and technical review mistakes exist. Descriptions of the "graded approach" appear in two different places (p. 5-2 and 5-23); these provide different (though partially overlapping) sets of criteria for grading activities. Section 5.1.2 "Environmental Monitoring, Monitoring of the Performance of the Disposal System and Analysis Activities" (p. 5-6) indicates that no monitoring need take place prior to closure, in direct contrast to the §194.42(c) requirement that monitoring of critical parameters commence before waste emplacement begins. The section concerning software (5.1.4, p. 5-77 ff) considers only PA software as necessary for compliance activities, though software used in waste characterization and for site activities carried out by WID are also used for compliance with 40 CFR 194. In Section 5.3.7, Document Control (p. 5-28), WID's principal procedures for document control are not listed--and WID has been tasked with the ultimate storage of all pertinent documents to the project. Section 5.3.9 (p. 5-29) offers no objective evidence (in the form of governing procedures) to show that identification and control of items is required to be performed, though all the other sections of Section 5.3 have such references.

In Section 5.1.3,(p. 5-6), it is asserted that since the EPA had reviewed site selection and site characterization QA programs during examination of the 1989 No-Migration Variance Petition (NMVP) that the QA for site selection and characterization should be considered satisfactory. This is untenable on several grounds, not the least of which is that the NMVP is for compliance with 40 CFR 268.6, which has no requirement that QA programs must comply with the 1989 versions of NQA-1, NQA-2 Part 2.7, and NQA-3, as is found in 40 CFR 194.

Section 5.4.2 (Page 5-44) illustrates several potential deficiencies. The initial paragraph contains a statement which includes placeholders, as follows:

> A primary result of the qualification of the SNL QA audit and surveillance programs **[Placeholder]** the determination of which performance assessment data provided by SNL subcontractors **[Placeholder]** collected under an approved QA program and which data requires additional qualification.

Unfortunately, without the placeholders, the statement has effectively no useful semantic content, and cannot be analyzed in relation to the requirements of 40 CFR 194.

The next paragraph describes the change from the SNL QAPD revision P to revision R. Some mention of revision Q would prevent possible confusion.

Under the heading "Scientific Investigation" (still Section 5.4.2, p. 5-44), the statement is made that

> QAP 20-2 was added to address scientific notebooks. Previously, scientific notebooks were rarely used...

Notebooks are usually considered the basic documentation of scientific work, and the DOE may want to reconsider the phrasing of the second part of the statement.

The results of SNL Audit IA 95-03 (August, 1995) are reported in Section 5.4.2.1, Data Qualification (pp. 5-44, 45):

> The audit resulted in 14 findings in the areas of calibration, procedures, training, experimental planning, test records, and equipment and data acquisition...The audit concluded that, with the exception of the Corrective Action Requests, there was evidence that SNL QA controls were in place and that they were adequate and effectively implemented.

Given the breadth of the Corrective Action Requests(CARs), what areas were left to show adequate and effective implementation of the QA controls? In this presentation, it seems as if the program was considered adequate and effective regardless of the audit findings. Chapter 5 also lacks discussion of the process used by audit teams for determining the effectiveness of QA programs; if adequacy and implementation effectiveness statements are

included in the CCA, then the process by which these statements are generated should be described.

Almost no document in Chapter 5 is properly referenced. QA documents are listed without version numbers; published government documents are listed without document numbers (p. 5-6, "Background Document..."; p. 5-14, "DOE/Albuquerque Operations Manual"), or without even a title (p. 5-11, "This task was documented in a DOE Headquarters report..."). None of these documents appear in the bibliography for the chapter, either.

Anything more than a rudimentary review by personnel familiar with the overall WIPP project and QA would have uncovered at least some of these deficiencies. In a QA chapter, the DOE has failed to adequately perform one of the basic principles of QA--review of documents. Such an omission creates an erroneous impression of the quality of QA activities that CAO has developed in the last few years.

Chapter 5 does not address CAG expectations.

While it is not a compliance requirement for DOE to fulfill the expectations in the Compliance Application Guidance (CAG EPA 402-R-95-014), the guidance was developed to assist the EPA in determining if the CCA is complete (CAG, page 1). The document goes on to state (also page 1):

> A completeness determination is a threshold determination that the application warrants further scrutiny, so that EPA, DOE, and the public do not invest major resources in a rulemaking proceeding for an incomplete document will likely (and justifiably) consider the CCA incomplete until these expectations are met.

There is no evidence in Chapter 5 that the expectations in the CAG were considered during the development of the chapter. The DOE sent out Chapter 5 with a matrix which matches the requirements of 40 CFR 194 QA requirements with the chapter, but makes no reference to the CAG expectations. There are no statements, references, or sections within Chapter 5 that echo language or structure unique to the CAG. An attempt to verify that the five expectations on page 18 of the CAG were met in Chapter 5 produced febrile results--only one of the five could be considered to be completely met. These five expectations, and the result of the EEG's verification attempt, are as follows:

1. That DOE top tier QA documents demonstrating commitment to NQA-1 (1989), NQA-2 Part 2.7 (1990), and NQA-3 (1989) be included in the CCA. Revision 1 of the CAO QAPD (if Revision 1 will be the version used for the CCA—see expectation 3) could be said to meet this requirement by itself, and evidence in Chapter 5 is that this document will be included in Appendix QAPD.

   This expectation is also the heart of the 40 CFR 194 QA requirements, and it is not likely that it was included as a CAG consideration.

2. That DOE principal contractor top tier QA documents, and a list of all top tier documents of subcontractors performing quality affecting activities as listed in §194.22(a)(2), be in the application. Appendix QAPD will apparently include the SNL and WID QAPDs, but Chapter 5 includes no listing of subcontractor documents as specified, nor the top-tier documents for generator sites, and even the TRU-QAPD may not be included in Appendix QAPD (it is not so referenced in Chapter 5).

3. That the effective dates the documents from expectation 2 were in conformance with the NQA requirements be listed in the application. No effective dates were listed for QA documents in Chapter 5; version numbers were not even given.
4. That a list of quality affecting activities and items important to demonstration of compliance be included in the CCA. No such list is in Chapter 5.

5. That the rationale used in developing the list for expectation 4 be given. No list, no explanation.

Chapter 5 is manifestly not complete according to the criteria in the CAG, nor, it seems, has DOE made an attempt to meet the completeness for QA as identified in the CAG.

The included appendix was poorly presented.

In its mailing of Chapter 5, the DOE included a separate bound document, "Appendix RE5", dated May 10, 1996. The letter of transmittal indicates that

> This appendix contains excerpts and summaries of specific references used to support CCA conclusions within the chapter. It will allow reviewers to quickly find the specific portions of referenced documents when tracing the logic of the CCA's conclusions.

EEG could find no specific references in Chapter 5 to Appendix RF5, nor was the rationale for the contents of Appendix RE5 apparent. The appendix consists of brief abstracts from the NQA standards and two NUREG position papers (1297, Peer Review, and 1298, Qualification of Existing Data). The bibliographic references for the documents duplicate the bibliography in Chapter 5. All five documents are readily available as published documents. The abstracts, when pertinent, are not so lengthy that they could not have been quoted directly in Chapter 5.

Appendix RE-5 appears to either be an unnecessary addition to the CCA, or perhaps another "placeholder" into which filler material was inadvertently placed. In any case, it is apparent that the Appendix as it exists is not a well-thought-out addition to the CCA.

Two referenced appendices were not included.

In contrast to Appendix RE-5, two other appendices are referenced in Chapter 5, but neither of these were sent with the document. "Appendix QAPD" is referenced throughout much of

the chapter, and would seem to include the current QAPDs for CAO, SNL, and WID, but no complete listing of the contents is included. These documents are expectations in the CAG, along with other top-tier documents (see discussion of CAG requirements above).

"Appendix AUDIT" is said to contain results of internal audits and surveillances of the WID QA program, and lists of both internal and external audits and surveillances of the CAO, WID, and SNL (Section 5.4.4); whether generator site assessments are included as a part of "CAO" is indeterminate.

All references to Appendix AUDIT appear on the last page of Chapter 5 (p. 5-51). For such an Appendix to have real meaning, specific audits contained in it should be referenced by Chapter 5 as objective evidence that requirements have been met.

Without these appendices, the effectiveness of Chapter 5 cannot be completely assessed. Appendices QAPD and AUDIT should have been transmitted with the chapter.

Chapter 5 fails to address EEG's comments on the DCCA.

The EEG's comments on the DCCA QA chapter as published in EEG-61 (March, 1996) are also only partially addressed in Chapter 5. EEG (EEG-61 p. 5-2) suggested that the QA chapter should have addressed the requirements of 40 CFR 194.22, and Section 5.1 of Chapter 5 does address the requirements from 40 CFR 194.22(a), including the overriding requirement for conformance with the applicable NQA standards (NQA-1, NQA-2 Part 2.7, and NQA-3). However, 40 CFR 194.22(b) requires that:

> Any compliance application shall include information which demonstrates that data and information collected prior to the implementation of the quality assurance program required pursuant to paragraph (a)(1) [the requirement for the NQA standards] of this section have been qualified in accordance with an alternate methodology, approved by the Administrator or the Administrator's authorized representative, that employs one or more of the following methods: peer review...; corroborating data; confirmatory testing; or a quality assurance program that is equivalent in effect to...[the NQA standards].

Chapter 5 describes the processes used for data qualification by SNL (Section 5.4.2.1 and following sections, beginning on p. 5-44), but does not include information which demonstrates that the Administrator has approved of these methods.

As in the DCCA QA chapter, Chapter 5 emphasizes the QA program as it exists in 1996 over QA of the data gathering and processing activities which make up a major part of 40 CFR 194 requirements; this was another principal concern expressed in EEG-61. The CCA QA chapter should provide objective evidence that information utilized by the other sections of the CCA fulfills the quality requirements in 40 CFR 194. In places this is partially achieved; Table 5-4 contains a list of data packages qualified by the Independent Review Teams in the Qualification of Existing Data process under SNL's Quality Assurance

Procedure 20-3, but does not explain where and how these packages are used, and their importance to compliance, nor are any references or guidances provided that would allow confirmation of the table of contents.

Chapter 5 fails to adequately address EPA's comments on the DCCA.

The DOE has failed to completely address the EPA general comments on the QA chapter as provided in the enclosure from EPA's Larry Weinstock to CAO's George Dials dated October 31, 1995 (pp. 3 & 4). The EPA stated that;

> A number of assertive statements intended to describe the current status of the program are made without substantiation, including statements regarding training records, calibration records, and document and record control procedures. Objective evidence should be presented which demonstrates the successful implementation of these and other aspects of a quality assurance program for the WIPP. Examples of the evidence of implementation may include approved governing documents, implementing procedures, implementing plans and timetables, audits, surveillance, and verification reports, history of corrective actions, and the effective dates of program implementation.

Some of the governing documents, some of the procedures, and some of the effective dates of program implementation can be found in Chapter 5. However, many more assertive statements are to be found in Chapter 5 than were in the DCCA QA chapter, and objective evidence for them is not presented. A few examples follow: Section 5.1.6.2 (p. 5-11), "Original Repository Design", states that "All changes are approved by technically qualified individuals", but no evidence is supplied for the statement. Section 5.3.8 (p. 5-28), "Control of Purchased Items and Services", states that "Prospective suppliers are evaluated and selected on the basis of documented criteria", and eight bullets list other procurement controls said to be in place. However, only WID implementing documents are provided as evidences for the section, and these are for "Receipt Inspections" and "Source Inspections" (which may cover two of the eight bullets). The section does not reference the missing appendices, which might possibly include more objective evidence.

The DOE also seems to have made only a cursory attempt to address the more specific comments the EPA provided on the QA Chapter of the DCCA (transmitted as pp. 39-42 of the January 30, 1996 letter from Weinstock to Dials). For example, the first specific comment states in part, "The DCCA should have specified the roles of EM-1, EM-20, and EM-30". While Chapter 5's "Organizational Interfaces" chart (Figure 5-3, p. 5-21) shows EM-1 and EM-30, EM-20 is still not listed. The same EPA comment also implies that the organizations that conduct QA audits of contractors and waste generator sites should be listed; they aren't. Another EPA comment indicates that evidence substantiating that all workers were properly trained should be included; it wasn't.

The inclusion of the "Organization Interfaces" figure, which was not in the DCCA, implies

that the EPA's comments were considered on some level. However, it also seems obvious that no line-by-line check to make sure that concerns raised by EPA comments were addressed was made. A search for a random sample of three other EPA comments--lack of objective evidence for control and maintenance of QA records, missing data quality indicators for the waste characterization program, and a need to address software reporting, correction, and implementation of requirements--shows that only the last of these is included in Chapter 5.

Chapter 5 apparently circumvents CAO's own QA program.

The weaknesses described above, in a chapter concerning QA, are apparently due to circumvention of the DOE's own QA program. CAO Management Procedure (MP) 4.4, Revision 0, dated April 19, 1996, states (Section 3.1.1) that

> Before a document is produced, the requestor should evaluate the need, end use, cost-effectiveness, intended audience, duplication of effort, regulatory and technical requirements, and any external organization's requirements or agreements related to the document.

MP 4.4 also establishes review processes, which are to be in performed in accordance with MP 4.2.

Recommendation

The DOE should consider developing not only Chapter 5 but all of the CCA under the requirements of the CAO QAPD, Revision 1. A solid quality assurance program is of little utility unless work is performed under its control.

Department of Energy
Carlsbad Area Office
P.O. Box 3090
Carlsbad, New Mexico 88221

Mr. Robert H. Neill, Director
Environmental Evaluation Group
7007 Wyoming Blvd. NE, Suite F-2
Albuquerque, N.M. 87109

Dear Mr. Neill:

We were quite surprised by your July 22, 1996 letter that expressed your concerns with Chapter 5, "Quality Assurance", of the Waste Isolation Pilot Plant (WIPP) Compliance Certification Application (CCA). Your letter implied that there are deficiencies in the Carlsbad Area Office (CAO) Quality Assurance (QA) program based upon your analysis of the Chapter 5. Contrary to this, we have shown time and again, through surveillance and audit, that the CAO QA program is effective. Let me remind you that the Carlsbad Area Office has just been audited by the Department of Energy-Headquarters (EM-30), led by an NQA-1 certified QA auditor, during which some of your staff attended, along with the Environmental Protection Agency (EPA). The report concluded that the CAO QA program was adequate and effective.

We feel that many of your comments are incorrect, exaggerated, and in some cases they reflect a basic lack of understanding of the intended requirements, expectations, and subject material. Your analysis brings to mind that we are not aware of any Environmental Evaluation Group (EEG) employee who is a certified QA auditor or has the relevant QA experience to make the judgments of a QA program as contained in your letter. Please reconsider your conclusions based upon the following:

General Comments

The following general responses are provided to express our overall disagreement and disappointment with your response. Specific responses to each of your concerns are addressed in the enclosure to this letter.

1. Your letter indicates that Chapter 5 contained significant omissions and errors. We totally disagree with this statement. Specific responses provided herein should convince you that Chapter 5 contains neither significant omissions nor significant errors.

2. With respect to the "placeholders" identified in Chapter 5: the placeholders were planned and incorporated in the May 31, 1996 revision, to flag events that had not yet occurred, but would take place at a later time. The placeholders represented assessment dates or conclusions that had not been fully completed by the May 31, 1996, Chapter 5 submittal date. The placeholders do not represent "data and analyses" as alluded to in your letter. The missing appendices referred to are not critical to the review of Chapter 5. EEG

currently has copies of the information in the appendices:

> Appendix QAPD is comprised of the CAO, SNL, and WID QAPDs. EEG has copies of these documents.
>
> Appendix SCHED is an example of a typical assessment schedule. EEG is on distribution for the quarterly issue of the CAO Assessment Schedule and the biweekly draft updates.
>
> Appendix AUDIT identifies in tabular form audits and surveillances performed by CAO, SNL, and WID, which are only indirectly related to supporting conclusions made in the Chapter. This information has also been provided to EEG in the form of the CAO Assessment Schedule.

Appendix RE-5 is a compilation of reference material from Chapter 5 and is intended to be a source of references or portions of references to make it easier for the reader. A similar appendix is included for each Chapter of the CCA.

3. Throughout your comments you refer to the "QA expectations" listed in "Section 194.22 Quality Assurance" of the Compliance Application Guidance (CAG).

   The Preamble to the CAG clearly indicates that the CAG is to be used as guidance:

   > "The CAG summarizes and explains the February 9, 1996 final rule. The United States Environmental Protection Agency (EPA) developed this guidance to assist the United States Department of Energy (DOE) with the preparation of any Compliance Certification Application (CCA) for the WIPP and, in turn, to assist in EPA's review for completeness and generally to enhance the readability and accessibility of the CCA for EPA and public scrutiny. It is EPA's intent that this guidance will facilitate the understanding that DOE and public have of the specific information that is expected to be included in a complete application for certification of compliance. Examples used for clarification in this guidance should not be considered exhaustive or definitive, since they are provided merely to facilitate DOE's understanding of the types of information EPA is expecting."

   The EPA staff clearly supports the position that the CAG is for guidance only. The CAG is only guidance and therefore should not be used by EEG to make an argument that Chapter 5 is deficient, nor that expectations have not been met.

4. We disagree with your statement that the May 31, 1996 revision of Chapter 5 fails to respond to EPA comments. Specific responses to the EPA Draft Compliance Certification Application (DCCA) comments were provided to EPA on January 23, 1996. In addition, the current revision of Chapter 5 has been specifically revised in format and content to address EPA DCCA comments.

5. Your comment relative to the lack of objective criteria used by audit teams "to determine the effectiveness of QA program adequacy and implementation" reflects a basic misunderstanding of QA audit processes, audit scopes, and audit terminology. Quality Assurance auditors and lead auditors are qualified and trained; lead auditors are certified. As part of their training, the three components of the audit conclusion are clearly presented. While it may appear that the process is subjective to casual observers, the process is well understood by qualified QA audit personnel. We feel that a discussion of basic auditing practices should not be included in Chapter 5.

The enclosure to this letter will further address the specific points included in your enclosure "CCA Ch. 5 (DOE/CAO-96-2056) Review."

In summary, your letter does not provide an accurate assessment of the condition, content, or quality of Chapter 5. Again, we feel that many of your comments are incorrect, exagerrated, and in some cases they reflect a basic lack of understanding of the intended requirements, expectations, and subject material.

We are, however, currently updating the placeholders and other information contained in Chapter 5 and will consider the specific comments you have made. If it is appropriate that they be addressed in Chapter 5, we will do so.

Sincerely,

George E. Dials
Manager

Enclosure

cc w/enclosure:
R. Brown, CAO
M. McFadden, CAO
J. Mewhinney, CAO
J. Maes, CAO

Enclosure

This enclosure addresses the specific comments provided by EEG in the enclosure to the "Robert H. Neill letter to George Dials, dated July 22, 1996."

Introductory Paragraphs

Chapter 5 of the CCA, "Quality Assurance", published as DOE/CAO-96-2056, is an incomplete document which fails to adequately support compliance with the 40 CFR 194.22 QA requirements and the expectations for QA in the Compliance Application Guidance (CAG). This issuance of Chapter 5 appears to have been premature; material is missing adequate technical and editorial review were apparently not performed, and there seems to have been no attempt to compare its contents against the EPA's criteria for completeness, or comments on the DCCA version of the chapter.

1. We disagree. The document is complete (with the inclusion of placeholders for ongoing activities).
2. We disagree. Chapter 5 does adequately support compliance with the 40 CFR 194.22 QA requirements.
3. We disagree. The CAG is a guidance document and does not contain requirements.
4. We disagree. The Chapter went through extensive technical and editorial revision. Over 80 pages of Document Review Records that include comments and resolutions are maintained as CAO QA records.
5. We disagree. Responses to EPA comments were provided to EPA on January 23, 1996. Additionally, the current format and content of Chapter 5 are a direct result of the EPA comments made concerning the DCCA.

"Chapter 5 is an incomplete draft."

Chapter 5 as received by EEG on June 6, 1996, is a draft that would have been more appropriate in the DCCA. The document must be considered a draft, rather than a submittable document for compliance, as information has been replaced by "placeholders". The first page (5-1) has the following statement in the middle of a paragraph:

> ***This program of audits and surveillances assesses the adequacy and effectiveness of implementation of the individual QA programs. [Placeholder for conclusions concerning the adequacy and effectiveness of implementation of the CAO and SNL QA programs]. (Emphasis in the original)***

We disagree with the comment that it "would have been more appropriate in the DCCA." The Chapter is complete (with the inclusion of the placeholders). The use of placeholders was a planned feature that permits a review of the content with the knowledge that specific information will be updated as it becomes available.

There are many such placeholder statements to be found in the document. Page 5-16 has one, page 5-42 has two, page 5-48 has one, 5-44 has two, 5-46 has two, 5-47 one, 5-50 three, and there may be others. The apparent reason for many of the placeholder statements is that QA activities necessary for production of a QA chapter in the CCA have not yet been completed and adequately analyzed. The placeholder quoted above, for instance, probably is due to external audits which had been scheduled, but not completed, of SNL (performed in May and June 1996) and CAO (scheduled for July 15-19, 1996) prior to the writing of Chapter 5. Other placeholders (on p. 5-46 and 5-47) are related to peer review qualification of data; these peer reviews are still in progress.

> We agree with your description of the reasons for the placeholders used in Chapter 5. Further classification includes: Of the 21 placeholders identified in Chapter 5, 15 are for dates to be supplied as activities occur (e.g. audit dates); three are for a description of audit conclusions (when they are reached); two are to identify the past tense; and one is a table of the packages qualified through the Peer Review process.

The results of these QA activities may not always support the conclusions already drawn in Chapter 5. The effectiveness of SNL's QA program was recently adjudged as "marginal" by a CAO-contracted audit, and if the DOE intends to use the results of the audit in the CCA then some sort of updating activity should be performed to show that the program is adequate.

> With respect to the SNL audit conducted by CAO in May 1996, the SNL QA program was determined to be "marginal." CAO had already invited EEG and EPA to attend a review of the corrective actions for those areas that contributed to the marginal conclusion. This review is currently scheduled to be held during the last week of August. This evaluation will also include a review of the status and effectiveness of critical corrective actions identified during previous assessments.

Note that neither WID nor any of the generator sites were included in the placeholder statement quoted above. Adequacy and effectiveness of QA at these sites, too, was yet to be established at the time of publication of the document, though major audits of INEL (effective, except for ineffective ANL-West) and Rocky Flats (marginal) were performed in late 1995.

> We agree, WID will be included as appropriate. However, since none of the generator sites will be certified by 10/31/96, generator sites will not be included. QA program assessment conclusions will be prepared for the generator sites at the appropriate time.

In addition to "placeholder" statements, other information to be used for compliance is yet to be obtained. For example (from p. 5-3 and 5-4, Section 5.1.1):

> ***The TWBIR was prepared in compliance with the CAO QAPD and was audited by CAO QA on September 5 and 6, 1996.***

Since the EEG is reviewing Chapter 5 in June, 1996, it is not meaningful to take credit for an audit in September, 1996. The version of the TWBIR to be audited hasn't been published yet, either; and the version of the CAO QAPD with which it apparently is to comply was not officially transmitted to TRU-waste personnel (or EEG) until after Chapter 5 was received (distribution memo dated June 13, 1996, from CAO's QA Manager).

In the above question, the applicable version of the CAO QAPD is not listed, nor is the version number of the TWBIR.

We agree. We had also identified the typo reflecting the incorrect TWBIR audit date. The correct date was September 5 and 6, 1995. This has been changed. The audit was conducted in accordance with implementing procedures and CAO QAPD, Revision 0.

"Chapter 5 was not adequately reviewed by the DOE"

We disagree with the basic premise. Chapter 5 went through a rigorous and comprehensive review process conducted in accordance with CAO MP 4.2. Over 80 pages of review comments were identified, resolved, and, where appropriate, incorporated into the document. In addition, Chapter 5 went through extensive editing for grammar, format and consistency, by professional document editors.

Document version numbers are not to be found for most (if not all) documents in the chapter, which makes verification of many statements impossible.

We disagree with your comment relative to indicating the version, (or more correctly, the revision) of the CAO QAPD and other document referenced in the Chapter. Documents in any complex, regulated program will change over a given period of time and should always be verified for each application. Omission of the revisions for these documents is appropriate and reflects the basics of information controls.

Other editorial and technical review mistakes may be found also. Descriptions of the "graded approach" appear in two different places (p.5-2 and 5-23); these provide different (though partially overlapping) sets of criteria for grading activities. Section 5.1.2 "Environmental Monitoring, Monitoring of the Performance of the Disposal System and Analysis Activities" (p. 5-6) indicates that no monitoring need take place prior to closure, in direct contrast to the §194.42(c) requirement that monitoring of critical parameters commence before waste emplacement begins. The section concerning software (5.1.4, p. 5-77 ff) considers only PA software as necessary for compliance activities, though software used in waste characterization and for site activities carried out by WID are also used for compliance with 40 CFR 194. In Section 5.3.7, Document Control (p. 5-28), WID's principal procedures for document control are not listed—and WID has been tasked with the ultimate storage of all pertinent documents to the project. Section 4.3.9 (p. 5-29) offers no objective evidence (in the form of governing procedures) to show that identification and control of items is required to be performed, though all the other sections of Section 5.3 have such references.

1. We agree with some of the specific comments here. For example the comment relative to the grading paragraphs in the two locations. While they are included in the two separate locations for different reasons, the amount of detail in the "Applicability", Section 5.1, is not required. The description will be kept, but the details (bullets) will be deleted.

2. We agree with the comment regarding monitoring of the performance of the disposal system. Monitoring will commence prior to waste emplacement. Appendix I.TM to CCA Chapter 7 will be referenced as the document describing the WID performance monitoring.

3. We agree with your comment relative to additional software that should be referenced. In our current update we have already added words to describe the application of software to data acquisition activities, WID design activities, and nondestructive assay activities.

4. We agree that one additional WID document control procedure is appropriate for reference (WID WP15-PS3103). However, we do not agree that document control and QA records are related in the manner that you indicate. The document control procedures are not intended to address "... the ultimate storage of all pertinent documents to the project." Record storage requirements are different than document control requirements. In addition we are adding one WID implementing document that addresses the identification and control of items (WP 15-PM3517).

In Section 5.1.3 (p. 5-6) the theory is advanced that since the EPA had reviewed site selection and site characterization QA programs during examination of the 1989 No-Migration Variance Petition (NMVP) that the QA for site selection and characterization should be considered satisfactory. This is untenable on several grounds, not the least of which is that the NMVP is for compliance with 40 CFR 268.6, which has no requirement that QA programs must comply with the 1989 versions of NQA-1, NQA-2 Part 2.7, and NQA-3, as is found in 40 CFR 194.

We agree with the comment on the No Migration Variance Petition (NMVP) and had already noted this. We have updated this portion of Chapter 5.

Sections 5.4.2 (Page 5-44) illustrates several potential deficiencies. The initial paragraph contains a statement which includes placeholders, as follows:

> ***A primary result of the qualification of the SNL QA audit and surveillance programs [Placeholder] the determination of which performance assessment data provided by SNL subcontractors [Placeholder] collected under an approved QA program and which data requires additional qualification.***

Unfortunately, without the placeholders, the statement has effectively no useful semantic content, and cannot be analyzed in relation to the requirements of 40 CFR 194.

We disagree with the comment on the "semantic content" without the placeholders being included. The placeholders are intended to be replaced by the word "was" at the appropriate time to indicate that the activity has already occurred.

The next paragraph describes the change from the SNL QAPD revision P to revision R. Some mention of revision Q would prevent possible confusion.

We disagree with the need to discuss revision "Q" of the SNL QAPD. Since EEG has observed CAO audits and surveillances of SNL starting in August of 1995, you should be aware that there is no revision "Q" of the SNL QAPD. The alpha designators "O" and "Q" are often intentionally not used due to the potential for mistaking one for the other. This was the case here.

Under the heading "Scientific Investigation" (still Section 5.4.2, p. 5-44), the statement is made that

> ***QAP 20-2 was added to address scientific notebooks. Previously, scientific notebooks were rarely used...***

Notebooks are usually considered the basic documentation of scientific work, and the DOE may want to reconsider the phrasing of the second part of the statement.

We agree with the poorly phrased statement relative to the "previous use of scientific notebooks". This sentence will be deleted.

The results of SNL Audit IA 95-03 (August, 1995) are reported in Section 5.4.2.1, Data Qualification (pp. 5-44, 45):

> ***The audit resulted in 14 findings in the areas of calibration, procedures training, experimental planning, test records, and equipment and data acquisition...The audit concluded that, with the exception of the Corrective Action Requests, there was evidence that SNL QA controls were in place and that they were adequate and effectively implemented.***

Given the breadth of the CARs, what areas were left show adequate and effective implementation of the QA controls? In this presentation, it seems as if the program was considered adequate and effective regardless of the audit findings.

We disagree with your overall conclusion regarding the SNL internal audit (IA-95-03). The executive summary indicated:

"Within the scope of this audit it was determined that, with the exception of the identified CARs, there was evidence that SNL QA controls were in place and that they were adequately and effectively being implemented for those experimental programs addressed in Phases 1, 2, and 3."

There were 14 criteria evaluated over 11 experimental programs. The 14 CARs were distributed over the 11 experimental programs and were not concentrated in one particular area or in one particular program. Thus, neither the criteria nor the programs were compromised to the extent that the audit team would conclude that implementation was not effective.

Chapter 5 also lacks discussion of the process used by audit teams for determining the effectiveness of QA programs; if adequacy and implementation effectiveness statements are included in the CCA, then the process by which these statements are generated should be described.

We disagree with the need to include a discussion of basic auditing conclusions (adequacy, implementation and effectiveness). The CCA is not intended to be a primer on "how to audit".

Almost no document in Chapter 5 is properly referenced. QA documents are listed without version numbers; published government documents are listed without document numbers (p. 5-6, "Background Document..."; p. 5-14, "DOE/Albuquerque Operations Manual"), or without even a title (p. 5-11, "This task was documented in a DOE Headquarters report..."). None of these documents appear in the bibliography for the chapter, either.

1. We disagree with the need to include document versions, revisions, or other designators in the CCA. As previously indicated, Chapter 5 describes the QA program that is directed to the control of important WIPP activities. This program will constantly be changing as requirements, expectations, or the need for improvements arise.

2. We agree that the DOE Headquarters report should be identified. We had already researched the document title and date and have included it in the Chapter.

Anything more than a rudimentary review by personnel familiar with the overall WIPP project and QA would have uncovered at least some of these deficiencies. In a QA chapter, the DOE has failed to adequately perform one of the basic principles of QA--review of documents. Such an omission creates an erroneous impression of the quality of QA activities that CAO has developed in the last few years.

1. We disagree with the comment concerning "A rudimentary review by personnel familiar with the overall WIPP project and QA would have uncovered at least some of these deficiencies." As previously indicated Chapter 5 received extensive QA and editorial reviews. Likewise, we disagree with the use of the word "deficiencies".

Most of the EEG comments relate to areas that have been planned to be upgraded during the current review or comments relative to alternate ways to approach the Chapter.

2. We disagree with the statement that "DOE has failed to adequately perform one of the basic principles of QA -- review of documents. Such an omission creates an erroneous impression of the quality of QA activities that CAO has developed in the last few years." Review is not one of basic principles of QA, rather it is an activity that supports QA principles. The type of generalization indicated in this comment without any idea of the process that was used, is unprofessional and unnecessary.

"Chapter 5 does not address CAG expectations."

While it is not a compliance requirement for DOE to fulfill the expectations in the CAG, the guidance was developed to assist the EPA in determining if the CCA is complete (CAG, page 1). The document goes on to state (also page 1):

> ***A completeness determination is a threshold determination that the application warrants further scrutiny, so the EPA, DOE, and the public do not invest major resources in a rulemaking proceeding for an incomplete document will likely (and justifiably) consider the CCA incomplete until these expectations are met.***

There is no evidence in Chapter 5 that the expectations in the CAG were considered during the development of the chapter. The DOE sent out Chapter 5 with a matrix which matches the requirements of 40 CFR 194 QA requirements with the chapter, but makes no reference to the CAG expectations. There are no statements, references, or sections within Chapter 5 that echo language or structure unique to the CAG. An attempt to verify that the five expectations on page 18 of the CAG were met in Chapter 5 produced febrile results--only one of the five could be considered to be completely met. These five expectations, and the result of the EEG's verification attempt, are as follows:

> We agree that Chapter 5 is not complete with respect to the CAG, however, we disagree with your conclusion that it must be. The Preamble of the CAG clearly indicates that the CAG is to be used as guidance. The EPA staff clearly supports the position that the CAG is for guidance only.
>
> The CAG is only guidance and, therefore, should not be used by EEG to make an argument that Chapter 5 is deficient nor that expectations have not been met.

"The included appendix was poorly presented."

In its mailing of Chapter 5, the DOE included a separate bound document, "Appendix RES", dated May 10, 1996. The letter of transmittal indicates that

This appendix contains excerpts and summaries of specific references used to support CCA conclusions within the chapter. It will allow reviewers to quickly find the specific portions of referenced documents when tracing the logic of the CCA's conclusions.

EEG could find no specific references in Chapter 5 to Appendix RE5, nor was the rationale for the contents of Appendix RE5 apparent. The appendix consists of brief abstracts from the NQA standards and two NUREG position papers (1297, Peer Review, and 1298, Qualification of Existing Data). The bibliographic references for the documents duplicate the bibliography in Chapter 5. All five documents are readily available as published documents. The abstracts, when pertinent, are not so lengthy that they could not have been quoted directly in Chapter 5.

Appendix RE5 appears to either be an unnecessary addition to the CCA, or perhaps another "placeholder" into which filler material was inadvertently placed. In any case, it is apparent that the Appendix as it exists is not a well-though-out addition to the CCA.

We disagree. The Appendix RE5 is a compilation of reference material from Chapter 5. Appendix RE5 is intended to be a source of references or portions of references in context to make it easier for the reader. A similar Appendix is included at the end of each CCA Chapter.

"Two referenced appendices were not included."

In contrast to Appendix RE5, two other appendices are referenced in Chapter 5, but neither of these were sent with the document. "Appendix QAPD" is referenced throughout much of the chapter, and would seem to include the current QAPDs for CAO, SNL, and WID, but no complete listing of the contents is included. These documents are expectations in the CAG, along with other top-tier documents (see discussion of CAG requirements above).

"Appendix AUDIT" is said to contain results of internal audits and surveillances of the WID QA program, and lists of both internal and external audits and surveillances of the CAO, WID, and SNL (Section 5.4.4); whether generator site assessments are included as a part of "CAO" is indeterminate.

Without these appendices, the effectiveness of Chapter 5 cannot be completely assessed. Appendices QAPD and AUDIT should have been transmitted with the Chapter.

The missing appendices are not critical to the review of the chapter, but are now included.

Appendix QAPD is comprised of the CAO, SNL, and WID QAPDs. EEG has copies of all three documents.

Appendix SCHEDULE is an example of a typical assessment schedule. EEG is on distribution for the quarterly issue of the CAO Assessment Schedule and the weekly draft updates.

Appendix AUDIT is a list of audit and surveillances that were conducted by CAO, SNL, and WID, which are only indirectly related to supporting the conclusions made in this Chapter. EEG is on distribution for the quarterly issue of the CAO Assessment Schedule and the weekly draft updates.

Since none of the generator sites will be certified by 10/31/96, generator site assessments are not included as a part of Appendix AUDIT.

"Chapter 5 fails to address EEG's comments on the DCCA."

The EEG's comments on the DCCA QA chapter as published in EEG-61 (March, 1996) are also only partially addressed in Chapter 5. EEG (EEG-61 p. 5-2) suggested that the QA chapter should have addressed the requirements of 40 CFR 194.22, and Section 5.1 of Chapter 5 does address the requirements from 40 CFR 194.22(a), including the overriding requirement for conformance with the applicable NQA standards (NQA-1, NQA-2, Part 2.7, and NQA-3). However, 40 CFR 194.22(b) requires that:

> ***"Any compliance application shall include information which demonstrates that data and information collected prior to the implementation of the quality assurance program required pursuant to paragraph (a)(1) [the requirement for the NQA standards] of this section have been qualified in accordance with an alternate methodology, approved by the Administrator or the Administrator's authorized representative, that employs one or more of the following methods; peer review...; corroborating data; confirmatory testing; or a quality assurance program that is equivalent in effect to...[the NQA standards]."***

We disagree that the purpose of Chapter 5 includes addressing EEG comments. EEG comments were addressed and included in the January document that addressed all comments on the DCCA. You were provided a copy of this document by letter dated January 23, 1996.

Chapter 5 describes the processes used for data qualification by SNL (Section 5.4.2.1 and following Sections, beginning on p. 5-44), but does not include information which demonstrates that the Administrator has approved of these methods.

We disagree with your interpretation of when the Administrator has to approve methods for qualifying data and information collected prior to the implementation of the quality assurance program. It is our opinion that the EPA Administrator's authority in this area begins with the submittal of the CCA.

Table 5-4 contains a list of data packages qualified by the Independent Review Teams in the Qualification of Existing Data process under SNL's Quality Assurance Procedure 20-3, but does not explain where an dhow these packages are used, and their importance to compliance, nor are any references or guidance provided that would allow confirmation of the Table contents.

We disagree with the need to explain where and how QED packages are used and their importance to compliance in Chapter 5. This technical information is not appropriate to this chapter and is discussed in other CCA Chapters.

"Chapter 5 fails to adequately address EPA's comments on the DCCA."

Chapter 5 fails to adequately address EPA's comments on the DCCA.
The DOE has failed to completely address the EPA general comments on the QA chapter as provided in the enclosure from EPA's Larry Weinstock to CAO's George Dials dated October 31, 1995 (pp. 3&4). The EPA stated that:

> ***"A number of assertive statements intended to describe the current status of the program are made without substantiation, including statements regarding training records, calibration records, and document and record control procedures. Objective evidence should be presented which demonstrates the successful implementation of these and other aspects of a quality assurance program for the WIPP. Examples of the evidence of implementation may include approved governing documents, implementing procedures, implementing plans and timetables, audits, surveillance, and verification reports, history of corrective actions, and the effective dates of program implementation."***

Some of the governing documents, some of the procedures, and some of the effective dates of program implementation can be found in Chapter 5. However, many more assertive statements are to be found in Chapter 5 than were in the DCCA QA chapter, and objective evidence for them is not presented.

We disagree with your statement that the May 31, 1996 revision of Chapter 5 fails to respond to EPA comments. Specific responses to the EPA DCCA comments were provided to EPA on January 23, 1996. In addition, the current revision of Chapter 5 has been specifically revised in format and content to address EPA DCCA comments.

A couple of examples: Section 5.1.6.2 (p. 5-11), "Original Repository Design", states that "All changes are approved by technically qualified individuals", but no evidence is supplied for the statement. Section 5.3.8 (p. 5-28), "control of Purchased Items and Services", states that "Prospective suppliers are evaluated and selected on the basis of documented criteria", and eight bullets list other procurement controls said to be in place. However, only WID implementing documents are provided as evidences for the section, and these are for "Receipt Inspections" and "Source Inspections" (which may cover two of the eight bullets). This section does not reference the missing appendices, which might possibly include more objective evidence.

We disagree. Because WID is responsible for design, only WID implementing documents are appropriately provided Sections 5.3.8.

We disagree that the comment concerning qualifications and training of workers is not addressed. Section 5.1.6.2 (p 5-11) does state that changes are approved by "technically qualified individuals." Chapter 5 describes the CAO QA program that is used to train and qualify personnel. These records are subject to the audit process. Individual qualification and training records are maintained as QA records. We do not believe that the thousands of records for all WIPP personnel performing quality affecting activities are appropriate to be included in the CCA. These records are subject to the audit process.

The DOE also seems to have made only a cursory attempt to address the more specific comments the EPA provided on the QA Chapter of the DCCA (transmitted as pp. 39-42 of the January 30, 1996 letter from Weinstock to Dials). For example, the first specific comments states in part, "The DCCA should have specified the roles of EM-1, EM-20, and EM-30". While Chapter 5's "Organizational Interfaces" chart (Figure 5-3, p. 5-21) shows EM-1 and EM-30, EM-20 is still not listed. The same EPA comment also implies that the organizations that conduct QA audits of contractors and waste generator sites should be listed; they aren't. Another EPA comment indicates that evidence substantiating that all workers were properly trained should be included; it wasn't.

We disagree. Chapter 5's "Organizational Interfaces" chart is correct in not identifying EM-20. The EM-20 responsibility for QA oversight of WIPP has been re-assigned to EM-30. EM-30 recently performed an independent assessment of the CAO QA Program.

The inclusion of the "Organization Interfaces" figure, which was not in the DCCA, implies that the EPA's comments were considered on some level. however, it also seems obvious that no line-by-line check to make sure that concerns raised by EPA comments were addressed was made. A search for a random sample of three other EPA comments—lack of objective evidence for control and maintenance of QA records, missing data quality indicators for the waste characterization program, and a need to address software reporting, correction, and implementation of requirements—shows that only the last of these is included in Chapter 5.

We disagree that the EPA comments have not been addressed as identified by the random sample of three EPA comments - lack of objective evidence for control and maintenance of QA records, missing data quality indicators, and a need to address software reporting, correction, and implementation of requirements. The comments are addressed within the discussion of the appropriate implementing procedures and overall controls established by the QA Program. We do not consider it necessary to supply more detail in Chapter 5.

"Chapter 5 apparently circumvents CAO's own QA program."

The weaknesses described above, in a chapter concerning QA, are apparently due to circumvention of the DOE's own QA program. CAO Management Procedure (MP) 4.4, Revision 0, dated April 19, 1996, states (Section 3.1.1) that

Before a document is produced, the requestor should evaluate the need, end use, cost-effectiveness, intended audience, duplication of effort, regulatory and technical requirements, and any external organizations's requirements or agreements related to the document.

MP 4.4 also establishes review processes, which are to be in performed in accordance with MP 4.2.

1. We disagree with this topic in its entirety. The review process was conducted in accordance with MP 4.2. Results of the reviews, for this revision of CCA Chapter 5, including comment resolution documentation, were completed and are maintained as QA records.

2. We disagree that the CAO QA Program was circumvented in any respect and believe this EEG determination was based on a lack of facts and a lack of understanding of the CAO Quality Assurance Program.

ENVIRONMENTAL EVALUATION GROUP

AN EQUAL OPPORTUNITY · AFFIRMATIVE ACTION EMPLOYER

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MEMORANDUM

DATE: August 20, 1996

TO: Robert H. Neill, Director

FROM: Ben Walker, QA Specialist

SUBJECT: CAO Audit of SNL PA June 17-21, 1996

Tom Clemo and I observed the CAO audit of SNL's PA program during the week of June 17-21, 1996. Seven auditors were involved; other observers were Marc Italiano and George Basabilvazo from CAO, and Patrick Kelley, James Channell, David Back, and William Sublette for the EPA.

The audit team judged the PA program implementation of QA to be "marginal", and the software development and qualification was judged "marginally effective". Five draft Corrective Action Reports (CARs) were generated, and eight draft observations. Attachment 2 is a listing of these draft CARs and observations, and other material presented by the lead auditor at the closeout meeting.

Two items would seem to be of particular concern to QA for the PA effort: software codes were still not qualified, and some parameter values used by PA codes had been entered into the parameter database without formal processing. The software codes had incomplete baseline documentation but were nevertheless being utilized in Compliance Certification Application (CCA) calculations. The SNL QA Manager had agreed to this usage. The parameter value changes were a different sort of problem, in that the well-established parameters data entry formalism at SNL had been circumvented for the entry of some 25 parameter changes. These two events do not increase confidence in SNL's commitment to established quality for PA calculations.

A more complete description of these findings, and other events that took place during the audit, can be found in Appendix 1. The audit also found several laudatory practices at SNL; these include ease of retrieval of documents from the Sandia WIPP Central Files (SWCF), extensive error checking of inputs, software test scripting, and documentation and archiving of

software production runs. As always, SNL personnel were for the most part easily accessible and very helpful.

The auditors were well prepared, and those I observed stayed on task. Their knowledge and experience with SNL's QA efforts were readily apparent; and as is usual with CAO's auditors, they were persistent and thorough. This was a conscientious audit.

BAW:DC:sz
Enclosures

ATTACHMENT 1 to SNL PA Audit

Attachment 1 of the memorandum on the SNL QA audit (Walker to Neill, May 24, 1996) stated that:

> There still seems to be a sense at SNL that QA is secondary to scientific pursuit rather than an integral, and, for this project, essential part of it, and this attitude may have its effects even on QA personnel and their activities.

This hypothesis receives additional support from the sections that follow.

Software Qualification

Evidence of considerable effort to get the PA codes into QA conformance has been demonstrated in other software assessments in the recent past, and the documentation viewed in this audit was of good quality. However, SNL has decided to run calculations for the CCA using codes that are not yet in accordance with the dictates of NQA-2 Part 2.7, the 40 CFR 194 standard cited for software QA.

None of the PA codes were found to be fully qualified during the audit. Memoranda dated May 23, 1996 from the PA Manager in charge of software to the SNL QA Manager list the "current QA status" of each of the codes, all of whom contained incomplete items, and then request permission from the QA Manager to proceed with the CCA calculations. The QA Manager signed approval of the requests, without so much as initiating a CAR or requiring a schedule for completions.

A copy of the memorandum for NUTS is attached (Attachment 3); the distribution list shows that no copies were provided to the CAC. Nearly all aspects of the QA process are said to be "in progress"--i.e., none were completed. This includes the Requirements Document (RD) and the Verification and Validation Plan (VVP), which make up the first step in the NQA-2 Part 2.7 life cycle for software (§ 3.1; Requirements Phase), and define the requirements for the design of the testing phase and test cases. The memorandum later states that "Test cases #1 through #9 have been run" (though the requirements are still in draft) and that "...the testing is far along...."

The memorandum for CUTTING_S listed similar deficiencies (for all developmental parts of the software life cycle) in similar language. The other memoranda were probably similarly organized, though completion of parts of the life cycle may have occurred. NQA-2 Part 2.7 § 3.1 states:

> Software development shall proceed in a traceable, planned, and orderly manner...Software development may be performed in an interactive or sequential manner.

While "interactive" might be interpreted to indicate that test results can be used to change code requirements in an iterative fashion, it does not imply that all parts of the life cycle can be developed in parallel. Operational use of the software is the penultimate (6th) step in the software life cycle (followed only by the "retirement phase"), and NQA-2 Part 2.7 clearly states that for the "Operations and Maintenance Phase" (§ 3.6):

> Prior to this phase the software has been approved for operational use.

The memoranda also contain the statement that "The remaining testing and QA documentation will be completed expeditiously", and (for NUTS) that "If this testing uncovers any problems with NUTS then the impact on the CCA calculations would be assessed at that time". It seems likely that the purpose of the memoranda is to remove the pressure to complete QA work expeditiously; and the cost and effort to completely trace errors through a submitted CCA could be extensive.

The process to be followed as described in these memoranda are clearly at odds with the 40 CFR 194 requirements concerning software.

Parameter Entry Control

SNL-WIPP Form 464, WIPP Parameter Entry Form, is required for entry of any parameter values or changes in these values to the database for use by PA. Form 464s are initiated by the Parameter Task Leader, who enters information on the parameter, the change to be made, and justification for the change, attains signatures of the change requestor and an approval signature (others are sometimes required), then submits the Form 464 and supporting information to the Database Administrator as a Parameters Records Package (PRP). Data entry personnel are trained to use the Form 464s for input; the data entry person's signature is added to the 464, as is the signature of the person who checks the entry. The PRP, including the Form 464, is then filed in the Sandia Wipp Central Files (SWCF).

At the February 16, 1996, closeout of a CAO surveillance of parameters the lead auditor complimented SNL on the rigor with which use of Form 464s was enforced for database entry.

An auditor uncovered three or four parameters in the database for which no Form 464s could be found. In pursuit of this problem, the auditors were eventually shown a list of 25 parameters titled, "CHANGES NOT COVERED BY 464's". According to notes took while viewing this list, the first change entered was on February

16, 1996 (date of the closeout compliment mentioned above). That these entries had circumvented the established requirements was uncovered about a week later by a PI (while researching a parameter request from EEG). The compiling of the list began at that time.

It is one sort of error to fail to follow practices that have yet to be firmly established; it's another to fail in follow those that are established. During the audit we suggested that the audit team should find out the details of how these entries were made. We were informed that SNL would have to perform that activity and report it to CAO as part of the CAR resolution. It is hoped that the entries are the result of a preoccupied PI submitting changes directly to an improperly trained data entry person, but the problem is likely more serious.

In defense of SNL, this has all the appearances of being a single lapse in which all 25 parameters were changed in a matter of days, and SNL personnel were attempting to establish proper documentation. On the other hand, no internal CARs were generated by SNL's discovery of the problem.

Procedure Problems I: Data qualified by audit

During the audit, I had reason to read the versions of SNL QAPs 9-1 and 9-2 used by the auditors, and discovered lapses in each.

QAP 9-1 version 1 contained the statement (Section 4.3, Step 2):

> When data sets are used to support the analysis, document the source of the data and whether the data have been qualified through collection under an approved SNL QA program, the application of QAP 20-3, or *by SNL WIPP audit* (emphasis added).

Audits do not qualify data. When I questioned this statement it was explained to me that the phrase was more a slang term, and what was meant was that the program under which the data was developed had been audited by SNL to confirm that the program conformed to SNL's QA standards.

I was told SNL was in the process of revising the procedure, and indeed they were. EEG now has a copy of Revision 2 of the procedure, which became effective April 11, 1996, (a copy was received at EEG on April 18, 1996) and the statement quoted above has been removed. I remain confused, however. The audit was two full months after the effective date of the revision; why were auditors using the older one? And, why wasn't I simply shown that the newer version did not contain the item in question?

Analysis Plan AP-016, version 00, "Groundwater Modeling Analysis Plan for the Generation of Transmissivity Fields for the Culebra

Flow and Transport Calculations", dated May 2, 1996, Section 3.1, contained a similar statement:

> Only data that has been qualified through collection under an approved SNL QA program, through application of QAP 20-3, or *by SNL WIPP* audit will be used for this analysis [emphasis added].

I suspect this document was written with QAP 9-1 in hand; other analysis plans may have similar statements. This is an example of why the writing and reviewing of QA documentation is so important.

Procedures Problems II: Parameter "Category" Definitions

QAP 9-2, "Quality Assurance Requirements for the Selection and Documentation of Parameter Values Used in WIPP Performance Assessment" presented a more serious problem. The definition of parameter categories indicates that adequate control over parameters may not be adequately performed. Section 2.0 of the procedure offers a list of five categories, and states that Category 1, 2, and 3 parameters are subject to the requirements of the procedure, but 4 and 5 are not. The QAP 9-2 Revision 1 Category table:

Category	Description
5	Parameters not used in current compliance calculations;
4	Parameters that are model configuration parameters or that are assigned based on an assumed correlation of properties between similar materials;
3	Parameters representing physical constants...
2	Parameters representing the inventory of the waste to be emplaced at WIPP...
1	Parameters that do not fall into Categories 2 through 5, but are necessary to WIPP PA calculations.

The audit team failed to see why Category 4 parameters were deemed to be excludable from the QA requirements, and that the process for categorization of parameters was not adequate; a draft observation to that effect was made (draft Observation No. 3: in Attachment 2, p. 5).

I thought it should have been a CAR (and inappropriately said so at an audit team caucus). The table is unnecessarily confusing for the purpose of the procedure (establishing QA for

parameters). The procedure should have been written to require documentation for all parameters used in PA considerations, and should also require a documented rationale for parameters that are dropped from use in PA.

BEG's controlled copy version of SNL QAP 9-2 still shows Revision 1 as the current process to follow (August 9, 1996). The draft observation apparently had no effect on SNL, and parameters can still be included in PA calculations without necessarily being adequately documented.

Dating on Documents

Many kinds of SNL documents have inconsistencies in the dates listed in them. I have noticed several during previous audits and surveillances, but since the dates are always reasonably close I've not documented them.

Most pernicious are reviews or approvals of documents with dates that post-dated the issuance of the documents. For example, six Form 464s were found which were started on April 20, 1996, and entered into the database on April 22, 1996. The approvals for the change were all dated April 23, 1996.

Analysis plans I viewed had similar inconsistencies. "Analysis Plan for ORIGEN2 Inventory Calculations for First Phase Determination of the Initial Radionuclide Inventory for Performance Assessment Analysis Supporting the Compliance Certification Application", dated April 4, 1996, had all its signatures on or after April 9, 1996. "Analysis Plan for the Salado Flow Calculations (Task 1) of the Performance Assessment Analyses Supporting the Compliance Certification Application" was effective March 8, 1996, yet the author and reviewer signatures were dated March 12, 1996.

An internal SNL surveillance (96-08) of software was conducted on April 9-11, 1996. The surveillance report contains the following statement:

> One item of concern was the inconsistency of document dates. As this has been identified by CAO CAR 96-016, the inconsistencies will be listed in this report for correction without an additional CAR being issued.

The report has nine pages of documentation of violations which fall under CAO CARs for document dates and comment resolution. The report itself has an inconsistent date: the date on the memorandum transmitting it is April 3, 1996, 6 days before the surveillance took place.

Resolution of Previous CARs

A part of the scope of this audit was to verify the effectiveness of corrective actions for previous CAO CARs. None of the corrective actions were found by the auditors to be effectively implemented during this audit. Some, but not all, of the "observations" (a category for findings that could potentially generate CARs in the future if not corrected) for which CAO required responses were found to be adequately addressed.

Project Technical Baseline Updating

The FEPs plan suggested that the Project Technical Baseline (PTB) be updated. Discussions with SNL employees indicated that although significant changes in nearly all portions of the baseline have been instituted, SPM-2 (established in 1994) was still the PTB of record. "The CCA itself will be the new baseline" one employee stated, and suggested that the FEPs plan would be changed rather than establishing a pre-CCA update of the baseline.

U.S. Congress H.R. Hrg. 101-6/12

REVIEW OF THE STATUS OF THE WASTE ISOLATION PILOT PLANT PROJECT

pg. 163

HEARING

BEFORE THE

ENVIRONMENT, ENERGY, AND
NATURAL RESOURCES SUBCOMMITTEE

OF THE

COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

JUNE 12, 1989

Printed for the use of the Committee on Government Operations

U.S. GOVERNMENT PRINTING OFFICE
21-152 = WASHINGTON : 1990

Westinghouse Electric Corporation

Government Operations

[illegible]

Box 7078
Carlsbad NM 88221

May 5, 1989
MD:89:00514

Mr. Richard J. Figlik, Manager
Management Support Staff
U. S. Department of Energy
WIPP Project Office
P. O. Box 3090
Carlsbad, NM 88221-3090

DRAFT PLAN FOR AS-BUILTS

Dear Mr. Figlik:

Four different completion times have been looked at for completion of as-builts. The completion times looked at are 15 months, 12 months, 9 months and less than 9 months. The data provided in the previous correspondence, HA:89:4057 dated 4/26/89, was used as a basis for the plan development, the system breakout, and the system priority Currently, there are no funds within Westinghouse or people to support an as-built program. Past progress in this area has been made with people or funds diverted from other work. To get a quality product, a dedicated effort is needed. In order to obtain the necessary field data, there will be plant power outages and other impacts. Cables will have to be traced or rung out. It was assumed that the work would be conducted on any shift that the systems were available. Hourly rates and per diem costs are actual costs from PIAK. Where possible to prevent wasted time, activities would be worked in parallel. Due to problems scheduling outages, each team could be working on 5 or 6 systems at a time.

This document does not identify resources to correct any deficiencies discovered during the as-built program.

Sincerely,

M. R. Brown, Manager
Engineering & Repository
Technology Support

MRB/dc:3

HA:89:4064

Attachments (1): System Priority List
(2): Plan for Less than 9 Months
(3): Plan for 9 Months
(4): Plan for 12 Months
(5): Plan for 15 Months

U.S. Congress H.R. Hrg. 101-6/12

Attachment V of EEG Review of CCA, Chapter 5

REVIEW OF THE STATUS OF THE WASTE ISOLATION PILOT PLANT PROJECT

pgs. 330-332

HEARING

BEFORE THE

ENVIRONMENT, ENERGY, AND NATURAL RESOURCES SUBCOMMITTEE

OF THE

COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

JUNE 12, 1989

Printed for the use of the Committee on Government Operations

U.S. GOVERNMENT PRINTING OFFICE

United States Government **Department of Energy**

memorandum

DATE: JUN 1 [redacted]

REPLY TO ATTN OF: EH-331

SUBJECT: EH Oversight of the Waste Isolation Pilot Project (WIPP)

TO: Richard W. Starostecki, EH-30

This Office has completed two major efforts related to the oversight of WIPP. On April 28, 1989, we completed a one-week, onsite review of the WIPP Final Safety Analysis Report (FSAR). On May 15, 1989, we completed a Readiness Review Inspection (RRI). The EH staff trip report summarizing the FSAR review, dated May 4, 1989, and the RRI report are attached to this Memorandum. Your approval of the RRI report by signature on the cover page is requested.

During the FSAR review a team of EH staff and consultants interacted with DOE WIPP Project Office (DOE/WPO), Westinghouse, and Bechtel representatives to close out requests for information flowing from our review of the FSAR and supporting documents. This effort also included resolution of questions that arose from independent calculations performed for EH by Brookhaven National Laboratory (BNL).

Most of the information required to close EH concerns related to the FSAR was developed during the onsite FSAR review. The task was inhibited by almost total reliance on a single Bechtel representative to provide information related to the design or technical basis for selection of the structures, systems, and components that comprise the WIPP facility. This absence of knowledge on the part of operating staff indicates a significant deficiency in the transfer of the technical basis for the facility from the constructor (Bechtel) to the operating contractor (Westinghouse). Efforts are now underway to correct these deficiencies through such efforts as developing as-built drawings and the conduct of air flow tests to explore the rationale for the placement of monitors for airborne radioactive material.

Residual issues from the FSAR review have continued to be closed through review of later material provided by Bechtel and by onsite verification during the RRI. However, the accident analysis section of the FSAR contains issues that remain open and will be so noted in the EH Safety Evaluation Report. The seismic issues cited in the May 4, 1989, EH report are closed based on EH consultant review of analysis at the San Francisco offices of Bechtel.

The remaining design issue, documented adequacy of the concrete waste shaft key, is being addressed through new analyses by Bechtel to replace and update earlier analysis that were apparently destroyed and confirmatory analysis by BNL for EH. In our view, those retrospective analyses will likely have to be

supported by measurement of in situ stress in the inner surface of the concrete and monitoring of the key inside diameter for several years until its performance is sufficiently well understood for long-term acceptance. The likelihood of acceptable resolution appears good.

A fundamental management issue also remains open at this time; the adequacy of the DOE Quality Assurance (QA) program for the WIPP project. As presently structured, neither the dedicated QA staff, one person designated as the QA Manager, nor the low reporting level of the QA program meet the ANSI/ASME, NQA requirements espoused by DOE Orders. I believe that the adequacy of the DOE QA function at WIPP, particularly during the initial five-year experimental program will be a pivotal element in the successful demonstration of long-term isolation. Useful models for both DOE and the experimental program manager, Sandia National Laboratory, can be found in the evolving quality assurance programs associated with the high level waste program being conducted by the Office of Civilian Radioactive Waste Management. This issue deserves close and very high level attention.

The conduct of the RRI was based on 15 modules designed to sample a broad range of requirements based on commitments made in the FSAR, DOE Orders, the Design Validation Final Report (DVFR), and TSA criteria. The inspection was conducted by a twelve-member team of EH staff and consultants over a period of eight days. The team members reviewed the key technical documents that translated requirements into day-to-day operations, interviewed WIPP personnel, and inspected the facility buildings and systems.

As a result of the RRI, we have concluded that the physical plant at WIPP is very close to being ready for operation. The small number of exceptions appear to be addressed through satisfactory programs.

We have also concluded, however, that significant additional effort in ongoing staffing, training, procedure development, and documentation is necessary before EH could support a recommendation for startup. The areas most affected by these additional efforts are support functions such as radiological protection, maintenance, and quality assurance although additional training and qualification remain in operational areas as well.

Substantial efforts are underway in many of the areas needing improvement. For example, reorganization of the Radiation Protection Division was implemented during the week of our RRI, and we saw evidence of active recruitment efforts to staff this new organization. Although the as-built drawing effort noted above has not started, Westinghouse proposals for conduct of the program have been received and DOE/WPO has informed EH of its intent to make the availability of as-built electrical drawings to facilitate viable lockout and tagout procedures a first priority.

We have also briefly reviewed DOE/WIPP 89-011, Draft Plan For The Waste Isolation Pilot Plant Test Phase: Performance Assessment and Operations Demonstration, April 1989. This report summarizes the five year experimental program that will develop the data necessary to demonstrate the ability of the WIPP facility to meet applicable regulations and agreements for long term isolation. A complete internal review of DOE/WIPP 89-011 will require strong expertise in the geoservices and related geo-engineering disciplines that is not presently represented by cognizant DOE staff in the field or at headquarters.

James P. Knight
Director
Office of Safety Appraisals

cc: w/o attachment
W. Kornack, ACNFS
N. Krenz, RL
J. Tillman, WIPP
A. Follett, DP-122

8.9 Summaries of Waterflows for the New Mexico Oil Conservation Division Districts 1 and 2

SUMMARY OF WATERFLOWS IN NMOCD DISTRICT 1 (NOVEMBER, 1978 TO PRESENT)

(SORTED BY LOCATION)

LIST NO.	DATE	OPERATOR	LEASE NAME/ WELL NO.	UNIT	T-R-SEC	OCD INSP	REPORTER	DEPTH	WHILE DRILLING	GPM	PRESSURE	ADDITIONAL REMARKS
1	[illegible]	Aid Drilling	[illegible]	K	04-37-33			[illegible]				HIT WATERFLOW ON [illegible] WELL AT 3000'.
2	[illegible]	[illegible]	[illegible]	[illegible]	09-[illegible]-32			3052		4		DECREASED TO 2 [illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	11-[illegible]-36			[illegible]		60		[illegible]
4	[illegible]	[illegible]	[illegible]	C	11-[illegible]-35			[illegible]		100		[illegible]
5	[illegible]	[illegible]	[illegible]	L	15-[illegible]-35			[illegible]		[illegible]		
6	[illegible]	[illegible]	[illegible]	[illegible]	16-[illegible]-08	CLOSSO		[illegible]				WATER FLOW OUT SURFACE. [illegible]
7	[illegible]	Monsanto	Venture [illegible]	F	16-36-19			[illegible]				HIT WF @ [illegible]. OFFSET TO DISPOSAL.
8	[illegible]	[illegible]	[illegible]	M	[illegible]-37-[illegible]	CLEMENTS						PLUGGED WELL IN 3 DAYS [illegible] AROUND MARKER. [illegible]
9	[illegible]	Arco	[illegible]	E	17-32-[illegible]							[illegible] THAT HAD [illegible] AT SURVEY TIME. [illegible]
10	[illegible]	Arco	[illegible]	J	17-32-[illegible]	BENTON		[illegible]				[illegible] SOME GAS DRILLING AT [illegible]
11	[illegible]	Arco	[illegible]	H	17-32-[illegible]							BETWEEN [illegible] WATERFLOW [illegible]
12	[illegible]	Conoco	MCA [illegible]	O	17-32-[illegible]							
13	[illegible]	Conoco	MCA Unit [illegible]	[illegible]	17-32-27							
14	[illegible]	[illegible]	[illegible]	C	17-32-32			[illegible]				HIT WATERFLOW ON DRILLING WELL
15	[illegible]	[illegible] Exploration	[illegible]	M	17-32-32	CLEOSO		[illegible]				LARGE WATER FLOW FROM SALT.
16	[illegible]	[illegible]		[illegible]	17-33-[illegible]			[illegible]				[illegible]
17	[illegible]	[illegible] Royalty	[illegible]	[illegible]	17-33-[illegible]			[illegible]				
18	No date	[illegible]	[illegible]	M	17-33-[illegible]							
19	[illegible]	Phillips	[illegible]	[illegible]	17-33-[illegible]			4300				HIT [illegible]
20	[illegible]	Phillips	Leamex [illegible]	[illegible]	17-33-[illegible]			[illegible]	DRLG			[illegible]
21	No date	Phillips	Leamex [illegible]	[illegible]	17-33-[illegible]							
22	[illegible]	Phillips	Leamex [illegible]	[illegible]	17-33-[illegible]			[illegible]		31		
23	[illegible]	Phillips	[illegible]	[illegible]	17-33-[illegible]					[illegible]		
24	[illegible]	Phillips	[illegible]	[illegible]	17-33-[illegible]			[illegible]	DRLG	31		
25	[illegible]	Phillips	[illegible]	C	17-33-[illegible]			[illegible]		[illegible]		WELL [illegible] LOCATIONS FROM INJECTION WELL. [illegible]
26	[illegible]	Phillips	[illegible]	D	17-33-[illegible]			[illegible]		[illegible]		VAC AREA.
27	No date	Mobil	[illegible]	[illegible]	17-34-[illegible]			[illegible]				REPAIR JOB WATER ENTERING CSG AT [illegible]
28	[illegible]	Mobil	State [illegible]	[illegible]	17-34-[illegible]							TBG/CSG LEAK REPORTED. WILL REPAIR [illegible]
29	[illegible]	Phillips	Lea [illegible]	L	17-34-30			[illegible]		40		[illegible]
30	[illegible]	Phillips	Lea	L	17-34-30			[illegible]				
31	[illegible]	Phillips	Lea [illegible]	[illegible]	17-34-30			[illegible]		[illegible]	150	
32	[illegible]	Phillips	[illegible]	[illegible]	17-34-30			[illegible]				CASING COLLAPSED [illegible]
33	[illegible]	Texaco	Central Vac Unit [illegible]	O	17-34-34	CLOSSO		1167		[illegible]	[illegible]	WATERFLOW @ [illegible]
34	[illegible]	Texaco	Central Vac Unit [illegible]	I	17-34-[illegible]	CLEMENTS		1167	DRLG	10		WATERFLOW @ [illegible] 10 BPH
35	[illegible]	Texaco	Central Vac Unit [illegible]	K	17-34-[illegible]	CLEMENTS		[illegible]	DRLG	15		WATERFLOW @ [illegible] 15 BPH. RAN CSG. AND CEMENTED OFF
36	[illegible]	Texaco	Central Vac Unit [illegible]	[illegible]	17-34-[illegible]	BUNYON		[illegible]	DRLG	76		WATERFLOW @ [illegible] 76 BPH.
37	[illegible]	Texaco	Central Vac Unit [illegible]	M	17-34-[illegible]	BUNYON		[illegible]		60	[illegible]	WATERFLOW @ [illegible] 60 BPH. [illegible]
38	[illegible]	Texaco	Central Vac Unit [illegible]	N	17-34-[illegible]			[illegible]	DRLG	60		WATERFLOW @ [illegible] TOTAL FLOW [illegible]
39	[illegible]	Texaco	[illegible]	N	17-34-[illegible]			[illegible]	DRLG	[illegible]		WATERFLOW @ [illegible] AT [illegible]
40	[illegible]	Texaco	Central Vac Unit [illegible]	[illegible]	17-34-[illegible]			[illegible]	DRLG			WATERFLOW @ [illegible]
41	[illegible]	Texaco	Central Vac Unit [illegible]	[illegible]	17-34-[illegible]				DRLG			RUNNING PIPE APPROXIMATELY [illegible] NO OTHER INFO AVAILABLE - [illegible]
42	[illegible]	Texaco	[illegible]	O	17-34-[illegible]				DRLG	500		WATERFLOW WHILE CEMENTING. [illegible]
43	[illegible]	Texaco	Central Vac Unit [illegible]	F	17-34-[illegible]	CLEMENTS		[illegible]		60	250	WATERFLOW @ [illegible]
44	[illegible]	Texaco	Central Vac Unit [illegible]	F	17-34-[illegible]	CLEMENTS		[illegible]		100		WATERFLOW @ [illegible] CEMENT [illegible]
45	[illegible]	Texaco	[illegible]	F	17-34-[illegible]			[illegible]	DRLG	[illegible]	450	WATERFLOW @ [illegible] RESUMED DRILLING @ [illegible] A.M.
46	[illegible]	Phillips	[illegible]	F	17-35-[illegible]				PROD	9		[illegible] FLOW OUTSIDE [illegible] CSG. [illegible] WILL REPAIR.
47	[illegible]	Phillips	[illegible]	I	17-35-[illegible]			[illegible]	DRLG			[illegible] PER MINUTE
48	No date	Phillips	[illegible]	J	17-35-31							
49	[illegible]	Texaco	[illegible]	N	17-35-31			[illegible]	DRLG	2500	[illegible]	[illegible] CHANGE VALVE TO GO INTO FLOW LINE. NOW [illegible]
50	No date	Phillips	[illegible]	[illegible]	17-35-31							
51	[illegible]	Phillips	[illegible]	[illegible]	17-35-[illegible]							DEVELOPED WATERFLOW FROM SURFACE CSG.

SUMMARY OF WATERFLOWS IN NMOCD DISTRICT 1 (NOVEMBER, 1978 TO PRESENT)

(SORTED BY LOCATION)

LIST NO.	DATE	OPERATOR	LEASE NAME/ WELL NO.	UNIT	T-R-SEC	OCD REP	REPORTED	DEPTH	DRLG OR PROD	BPH	PRESSURE	ADDITIONAL REMARKS
52	8/7/83	Arco	State [illegible] 1576 #[illegible]	M	17-35-32					40		WATER FORCED INTO CELLAR. HAULED 40 BBLS & APPEARED TO BE FLOWING ABOUT 4 BPH FROM AROUND SURFACE
53	8/7/83	[illegible]	[illegible]	M	17-35-32							
54	5/8/78	Phillips	[illegible] Vacuum Unit	N	17-35-33	CLEMENTS		2500'		70		
55	4/3/91	Texaco	[illegible] #1L	4	18-34-04			1760'	DRLG	60		4/3/91 @ 1760', CROSSFLOWED THEN FLOWED. 4/4/91 @ [illegible] @ 30 BPH.
56	11/29/78	Texaco	Vac GSA Unit #57	8	18-34-04			[illegible]	PROD	8-10	1100	CASING LEAK AT [illegible] IN CELLAR. WATERFLOW @ 8-10 BPH. SIP=1100 PSI.
57	4/18/[illegible]	Texaco	[illegible] #[illegible]	[illegible]	18-34-01			[illegible]	DRLG	40		WATERFLOW @ [illegible] @ 40 BPH
58	4/22/[illegible]	Texaco	[illegible]	[illegible]	18-34-01			[illegible]	DRLG	16		WATERFLOW @ [illegible] @ 16 BPH
59	No date	Texaco	[illegible]	[illegible]	18-34-01				PROD			
60	7/3/90	Texaco	[illegible] #157	C	18-34-01			[illegible]	DRLG	100		WATERFLOW @ [illegible] @ [illegible] BPH.
61	3/[illegible]	Texaco	[illegible] 30	E	18-34-01							SEE WATERFLOW ON INTERMEDIATE. SAMPLED @ [illegible] PPM
62	No date	Texaco	[illegible] #140	M	18-34-01							
63	4/7/[illegible]	Texaco	NM [illegible] NCT [illegible]	M	18-34-01			[illegible]	DRLG	90		WATERFLOW @ [illegible] @ [illegible] BPH, NO OTHER INFORMATION AVAILABLE
64	7/7/[illegible]	Texaco	NM [illegible] NCT-[illegible]	P	18-34-01			[illegible]	DRLG	144		VAC POOL
65	7/[illegible]	Texaco	NM [illegible] NCT-3 [illegible]	P	18-34-01				DRLG			WATERFLOW @ [illegible]. TOTAL FLOW=2200 BWPH.
66	3/[illegible]	Texaco	West Vac Unit #40	G	18-34-02				PROD		[illegible]	WATERFLOW THRU CSG VALVE. WILL REPAIR.
67	[illegible]	Amoco	[illegible]	[illegible]	18-34-[illegible]			[illegible]		90		HIT WATER FLOW ON DRLG. WELL AT [illegible] - [illegible].
68	No date	Phillips	[illegible]	I	18-35-[illegible]							[illegible] FLOW AT SHOE OF 8 5/8 ON REPLUG JOB
69	[illegible]	Texaco	Central Vac Unit #[illegible]	[illegible]	18-35-[illegible]			[illegible]	DRLG	55		WATERFLOW @ [illegible] @ [illegible] BPH
70	2/25/91	Texaco	NM [illegible] NCT-1 #[illegible]	[illegible]	18-35-[illegible]			[illegible]	DRLG	30		WATERFLOW @ [illegible] @ 30 BPH. AT [illegible]
71	10/13/78	Texaco	Central Vac Unit #137	D	18-35-06	CLEMENTS		2090'	DRLG	1000		WATERFLOW [illegible] @ [illegible] 1000 BBLS/HR.
72	10/27/[illegible]	Texaco	Central Vac Unit [illegible]	D	18-35-06			[illegible]	DRLG	[illegible]	700	WATERFLOW @ [illegible]
73	10/27/78	Texaco	Central Vac Unit #134	E	18-35-06	CLEMENTS		[illegible]	DRLG			WATERFLOW @ [illegible] @ [illegible] BPH.
74	2/79	Texaco	Central Vac Unit #105	E	18-35-06	CLEMENTS			PROD			RE-ENTERED TO RELIEVE PRESS. FLOWING FROM [illegible]. [illegible]
75	4/79	Texaco	Central Vac Unit #100	F	18-35-06	CLEMENTS		[illegible]	DRLG	35	800	WATERFLOW @ [illegible] AND [illegible]. [illegible]
76	[illegible]/78	Texaco	Central Vac Unit #109	G	18-35-06	[illegible]		2017'	DRLG		800	WATERFLOW @ [illegible] @ 10 BPH. INC. TO [illegible] BPH. [illegible]
77	[illegible]/30/[illegible]	Texaco	Central Vac Unit #108	G	18-35-06			[illegible]	DRLG	10		WATERFLOW @ [illegible] AND [illegible]. TOTAL = 15 BPH. [illegible]
78	No date	Texaco	Central Vac Unit #107	G	18-35-06	CLEMENTS		[illegible]		30		
79	7/25/[illegible]	Texaco	Central Vac Unit #[illegible]	H	18-35-06				DRLG			WATERFLOW @ 4:00 A.M. RATE=[illegible] BPH. SIP=200#.
80	2/20/[illegible]	Texaco	NM [illegible] NCT-1 #[illegible]	H	18-35-06			[illegible]	DRLG	[illegible]		WATERFLOW @ [illegible] @ [illegible] BPH.
81	[illegible]	Texaco	Central Vac Unit #[illegible]	J	18-35-06			[illegible]	DRLG	15		WATERFLOW ON [illegible] WELL @ [illegible]. FLOWING 15 BPH. DRILLING AHEAD WITH NO INCREASE IN VOLUME. WILL SET [illegible]
82	[illegible]/91	Texaco	[illegible]	K	18-35-06			[illegible]	PROD	400		HIT WATERFLOW ON [illegible]. FLOWED [illegible] BPH
83	[illegible]/90	Texaco	Central Vac Unit #[illegible]	L	18-35-06			[illegible]	DRLG	[illegible]		WATERFLOW @ [illegible] @ [illegible] BPH. INC. TO [illegible] BPH @ [illegible]. [illegible]
84	[illegible]/91	Texaco	Central Vac Unit #[illegible]	L	18-35-06	CLEMENTS		[illegible]	DRLG			WATERFLOW @ [illegible]. TOTAL FLOW = [illegible] BPH. SIP=[illegible]. [illegible]
85	4/[illegible]	Texaco	Central Vac Unit #[illegible]	M	18-35-06				PROD			WATERFLOW AFTER BOTTOM WAS PLUGGED OFF ON P&A.
86	[illegible]/79	Texaco	Central Vac Unit #[illegible]	N	18-35-06			[illegible]	DRLG	40-50	1005	WATERFLOW ON DRILLING WELL @ [illegible] FLOWING 40-50 BPH. SIP=1005#. [illegible]
87	[illegible]/79	Texaco	Central Vac Unit #[illegible]	O	18-35-06			[illegible]	PROD	10	1100	WATERFLOW @ [illegible] @ 10 BPH. SIP=1100#
88	[illegible]/79	Texaco	Central Vac Unit #[illegible]	G	18-35-07			[illegible]	DRLG	15		WATERFLOW @ [illegible] @ 15 BPH. SIP=1000#. [illegible]
89	5/[illegible]/89	Energy Reserves	[illegible] #[illegible]	J	18-35-08			[illegible]				POSSIBLY PLUGGED.
90	No date	Mewbourne	[illegible]	L	18-35-[illegible]							
91	12/[illegible]/84	[illegible] Energy	Arco [illegible] #[illegible]	O	18-35-[illegible]			[illegible]		400-500		4 HRS LATER FLOWING 1500 BPH @ [illegible]. [illegible] DISPOSAL WELL.
92	[illegible]/87	[illegible] Enterprises	[illegible]	P	18-[illegible]				DRLG	[illegible]		
93	1/[illegible]	Olsen Energy	[illegible]	[illegible]	18-36-27				DRLG			[illegible] DRLG DEPTH UNKNOWN. 30 BPH. COMPLETED AS [illegible]. INTEND TO P&A [illegible].
94	3/[illegible]/88	Hondo	[illegible]	D	18-36-27			[illegible]	DRLG	[illegible]	[illegible]	
95	12/[illegible]	Union Oil	[illegible]	F	19-33-33	CLEMENTS		[illegible]		100		
96	No date	Arco	[illegible]	G	19-34-[illegible]							
97	12/80	Amerada	[illegible]	B	19-37-[illegible]			[illegible]				
98	[illegible]	Amerada	[illegible]	C	19-37-32	[illegible]		[illegible]				
99	[illegible]	Getty	State [illegible] Com	K	19-37-3[illegible]			[illegible]				LOCATED WATER FLOW AT [illegible]. [illegible]
100	No date	Texaco	[illegible]	[illegible]	19-3[illegible]							
101	5/88	Amerada	[illegible] Unit	P	20-33-1[illegible]			[illegible]		600		
102	12/12/80	Amerada	[illegible]	Q	20-33-14			2511'		500		

SUMMARY OF WATERFLOWS IN NMOCD DISTRICT 1 (NOVEMBER, 1976 TO PRESENT)

(SORTED BY LOCATION)

UW NO.	DATE	OPERATOR	LEASE NAME/ WELL NO.	UNIT	T-R-SC	OCD-WP	REPORTER	DEPTH	DRLG OR PROD	BPH	PRESSURE	ADDITIONAL REMARKS
103	11/?/81	Arpin	Jordan #1	E	30-13-16			3419				DRLG.
104	8/?/81	Adam Aid	Bryan Terra Fed #1	G	31-13-35			2750				[illegible] NO [illegible] FLOW DOWN & CONTINUE DRILLING & REPORT.
105	No date	Tornado	Dennis #1	C	30-33-35					1700		APPROXIMATELY 200 YDS. FROM AID SO. TEXAS FEDERAL.
106	9/25/79	Arco	Baker Gas Com #1	I	20-37-08							
107	1/6/80	Texaco	CH Weir #4	F	20-37-11				PROD			[illegible] FLOW SALT SECTION. CSG. BURNED. (TEMP SURVEY)
108	3/?/79	Texaco	Chambers A #11	G	20-37-12	CLEMENS			PROD	24	10	TESTED BRADENHEAD. FLOWED 2 BPH. NORMAL.
109	9/?/81	Texaco	CH Weir #12	G	20-37-12				DRLG			WATERFLOW @ 1450'. [illegible] @ 4000'. TOC @ 1900'. 3 BPH ABOVE CEMENT.
110	1977	Texaco	Weir #1	G	20-37-12							WATERFLOW HAD TO PIPE. TOOK 4000 SX. TO SHUT OFF.
111	No date	Texaco	CH Weir #7	L	20-37-12							
112	1/?/84	Texaco	[illegible] #13	C	20-37-14			3497	DRLG	4		WATERFLOW @ 3497' @ 4 BPH (NOTE ON WATERFLOW AREA).
113	6/20/??	Texaco	[illegible] #15	H	20-37-15			3215	DRLG	24	175	WATERFLOW @ 3215' @ 24 BPH. [illegible]
114	3/?/80	Amoco	Gillully B Fed #4	G	20-37-22							NOT REPORTED - PULLED [illegible] ON [illegible]. HAD WTR. OUT 6 1/2". [illegible]
115	3/?/77	Conoco	State [illegible] #100	H	20-38-30	CLEMENTS		2700		20-30		
116	3/?/80	Conoco	[illegible] #101	O	20-38-32							P.W. PLUG BACK
117	1/?/??	Conoco	[illegible] #3	J	20-38-35							WF FROM PLUGGED WELL. [illegible] AWAY.
118	11/?/??	Phillips	Lake Fed #1	E	21-32-31			3062	DRLG	6-16	64	DRLG. PIPE [illegible] CSG. SETTING [illegible] CSG. APPROX. 3 A.M. ON 11/?/81. FLOW DOWN TO 6 BPH.
119	12/?/??	Amoco	[illegible] #1	K	21-37-32				PROD			[illegible]
120	3/?/81	Adobe	[illegible] #1	H	21-38-08							WATER FLOW FROM SURFACE CSG. [illegible] BRADEN STREAM.
121	4/?/??	Yates Petroleum	[illegible] #1	P	22-33-16			4800	DRLG	20-30		NO [illegible]. NONE [illegible]. PLAN TO [illegible]. [illegible]
122	9/?/??	Pogo Prod Co.	Red Tank [illegible] #1	B	22-33-34			3700	DRLG			FLOWED [illegible] - [illegible]
123	8/?/83	Sun	St. A AC-2 #84	A	23-36-02			3700		24		
124	8/?/??	Argo	SRCU #25	M	23-36-34							WATERFLOW OUT SURFACE CSG. [illegible] FOR [illegible] CHECK & INFO WATERFLOW OUTSIDE SURFACE CSG.
125	8/?/??	Argo	SRCU #36	H	23-36-34							
126	3/?/??	Argo	SRCU #39	K	23-36-35							
127	4/11/??	Exxon	Paradox Unit #5	N	23-37-02						400	WATERFLOW ON SURFACE PIPE & INTERMEDIATE PIPE.
128	9/?/??	Sohio	[illegible] #1	E	23-37-13							DUAL.
129	No date	Gulf	Hughes	D	23-37-14							
130	11/?/??	Anadarko	Hugh #18	E	23-37-14							BLEW MUD OUT SURFACE. HAD GAS PRESSURE & WF. WILL DO GAS ANALYSIS.
131	?/?/??	Anadarko	EW Walden #1	M	23-37-16							WATERFLOW FROM SURFACE - WHEN IT COMES OUT AROUND SURFACE PIPE.
132	8/?/80	Gulf	WT Cole NCT-A #3	A	23-37-16			3000	DRLG	16		HIT WF @ 3000' @ 16 BPH.
133	10/?/80	Gulf	Cole A #10	I	23-37-16			3500			1400	
134	11/?/81	Anadarko	LMPSU Tr 7 #3	C	23-37-31	SEXTON						
135	9/?/??	Anadarko	[illegible] #5	E	23-37-32			3500				HIT WF @ 3500'. [illegible] @ 3510' AND SET [illegible] CSG. [illegible] @ 3500'.
136	4/?/81	J. Meredith	Coastal Fed #1	F	23-37-33					4600		WF FROM [illegible]. [illegible]
137	2/?/81	Arco	[illegible] #8	H	23-37-33			1400		14-720	600	[illegible] FLOW [illegible]. WILL DRILL AHEAD. [illegible]
138	4/?/80	Marathon	J.L. Muncy #4	K	23-37-34			2000	DRLG			[illegible]. HIT @ 2000' DRLG. APPROX. 1200 BPD. [illegible] WELL.
139	3/?/78	H & O Partnership	[illegible] #1	C	23-37-35	SEXTON		1700				SALT WATER FLOW @ 1700'. DRILLING WELL STARTED AT RATE OF 2400 BPD & FELL TO 1000 BPD.
140	1/?/80	Sun	[illegible] #10	D	23-37-35			1600			500	[illegible] WATER CONTAINED IN PITS & HAULED TO DISPOSAL.
141	1/?/80	J. [illegible]	WT Cleland #3	D	23-37-35			2107				HIT 1" FLOW @ 2107' [illegible]
142	11/?/80	[illegible]	Amanda	O	23-37-35			1500		90		
143	1/?/??	[illegible]	[illegible]	A	24-37-26			2900	DRLG	22		HIT WF @ 2900'. ATTEMPTED TO PLUG OFF. P&A.
144	6/?/81	Anadarko	[illegible]	I	24-37-26							HIT WF.
145	4/?/81	Anadarko	LMPSU 16-3 #4	M	24-37-26			3000				SI FLOW [illegible] DOWN TO [illegible] NO [illegible] PROBLEM.
146	1/?/81	Anadarko	LMPSU #1-C	I	24-37-30			2400				[illegible] - NO FLOW.
147	1/?/81	Anadarko	LMPSU 36-7	A	24-37-34			3000		100		AHEAD [illegible] STILL FLOWING [illegible]
148	No date	Anadarko	LMPSU 5-21 #6	A	24-38-05							
149	4/?/81	Anadarko	LMPSU 5-21-?	F	24-38-05			3500		251		
150	No date	Texaco	[illegible] #1	I	24-38-06							
151	12/?/81	Texaco	[illegible] #1		24-38-06			3400	DRLG	44		WATERFLOW @ 3400' @ 44 BPH
152	3/?/81	Anadarko	[illegible] A #2	G	24-38-06			3500		42		HIT [illegible] WF AT 3500'. HAD [illegible]
153	2/?/80	C. Stumhoffer	[illegible] #1	A	24-38-06			3500		160		SI FLOW [illegible]

SUMMARY OF WATERFLOWS IN NMOCD DISTRICT 1 (NOVEMBER, 1978 TO PRESENT)

(SORTED BY LOCATION)

WELL NO.	DATE	OPERATOR	LEASE NAME / WELL NO.	UNIT	T-R-SEC	OCD MTP	REPORTS	DEPTH	DRLG OR PROD	BPH	PRESSURE	ADDITIONAL REMARKS
154	11/3/82	Amoco	All Blinebry Fed NCT-3 [illegible]	C	23-36-31			3035	DRLG	40	650	WATERFLOW @ 3000' @ 40 BPH. PRESSURE [illegible].
155	10/18/84	Amoco	All Blinebry Fed NCT [illegible]	D	23-36-31			1355	DRLG	1050		WATERFLOW @ 1350' @ 1050 BPH ON TOTAL [illegible]. TUBING FLOWED DOWN ENOUGH TO DRILL AHEAD
156	12/11/79	Amoco	SHC [illegible]	E	23-35-07							
157	7/4/83	Sun	Emery King NM [illegible]	C	23-36-01							CASING COLLAPSED APPROX [illegible]. WILL MOVE RIG TO COMPLETE PA
158	3/24/80	Amax	[illegible]	C	24-36-07							INT. REPAIR CASING. RUN BACK LOG.
159	11/6/79	A. Grayson	[illegible]	D	25-36-06							TROUBLE OF SALT WATER COMING OUT SURFACE. WILL PERFORATE @ 1200' & SQUEEZE.
160	[illegible]	[illegible]	[illegible]	M	25-37-01			1840	DRLG	400		SHUT IN PRESSURE 1000 [illegible].
161	10/20/81	[illegible]	[illegible]	F	25-37-03			2600		1000		DECREASED TO 300 BPH IN 12 HOURS
162	4/9/75	Texaco	[illegible]		25-37-03			3041	DRLG	400	525	WATERFLOW ON 4/9/75 @ 3041' @ 400 BPH. ANOTHER @ [illegible]. CEMENTED [illegible] CSG ON INTERMEDIATE.
163	1/10/85	Texaco	[illegible] A #37	J	25-37-08			1800		750		WATERFLOW @ [illegible] @ 3067' @ 750 BPH. [illegible] KEPT PIPE AND DRILLED AHEAD
164	[illegible]	Texaco	[illegible]	K	25-37-10				DRLG			WATERFLOW @ 3700' @ 65 BPH.
165	[illegible]	Texaco	[illegible]	N	25-37-10			2600	DRLG			[illegible]
166	No date	Texaco	[illegible] #3	N	25-37-04			3040	DRLG	80		SHUT IN PRESS 300 PSI.
167	11/29/83	Texaco	[illegible] #3	B	25-37-09			1444	DRLG	1200		WATERFLOW @ [illegible] @ 1200 BPH. [illegible] 300 PSI
168	[illegible]	Texaco	[illegible] #25	G	25-37-09			3085	DRLG	600		WATERFLOW @ 3085' @ 600 BPH. [illegible]
169	[illegible]	Texaco	[illegible] #4	D	25-37-09			1339	DRLG	55	850	WATERFLOW @ 1339' @ 55 BPH. [illegible] THROUGHOUT.
170	[illegible]	Texaco	[illegible]	K	25-37-09			1355	DRLG	100		WATERFLOW @ [illegible] @ 100 BPH. WATERFLOW @ [illegible] @ 1200 BPH.
171	7/24/84	Texaco	[illegible] #1	L	25-37-09			1537	DRLG	85		WATERFLOW @ 1537' @ 85 BPH
172	No date	Texaco	[illegible]	L	25-37-09			1579	DRLG	1000	650	WATERFLOW @ 1579' @ 1000 BPH. [illegible]
173	11/[illegible]	[illegible]	[illegible] #1	S	25-37-13			1580		800		
174	[illegible]	Texaco	[illegible]	F	26-37-33	[illegible]						WATERFLOW CSG. [illegible] TO REPAIR [illegible].
175	[illegible]	Texaco	[illegible]	C	26-38-33				DRLG			FLOWED [illegible].
176	[illegible]	Gulf	[illegible]	M	26-36-32							[illegible] REPAIR TO REMOVE CSG [illegible].
177	[illegible]	Texaco	[illegible]	P	26-36-32			1400	DRLG			WATERFLOW @ [illegible] @ [illegible] BPH. WATERFLOW @ [illegible] @ 30 BPH.
178	10/27/80	Gulf	[illegible]	I	26-10-16							[illegible] TO ELIMINATE CSG PRESSURE.
179	[illegible]	[illegible]	[illegible]	L	26-10-16			[illegible]	DRLG	[illegible]		[illegible]
180	[illegible]	[illegible]	[illegible]	A	26-37-15					[illegible]		
181	[illegible]	Texaco	[illegible]	C	26-37-37					[illegible]		WATERFLOW @ [illegible] BWPH. (NO REPORT TO OCD).
182	[illegible]	Texaco	[illegible]	F	26-37-37			[illegible]	PROD		400	WATERFLOW ON BRADENHEAD (NO REPORT TO OCD)
183	[illegible]	Texaco	[illegible]	I	26-37-37					900		WATERFLOW IN [illegible] @ [illegible] BWPH. (NO REPORT TO OCD).
184	1/79	Texaco	[illegible] #1	G	26-37-37			1050				WATERFLOW IN [illegible] @ [illegible]. (NO REPORT TO OCD).
185	10/11/79	Texaco	[illegible]	H	26-37-37					650		REPORTED TO OCD [illegible]. REPAIRED [illegible]
186	2/79	Texaco	[illegible] #4	H	26-37-37					450		WATERFLOW IN [illegible] @ [illegible] BPH. (NO REPORT TO OCD)
187	[illegible]	Texaco	[illegible] #20	I	26-37-37					825		WATERFLOW IN [illegible] @ [illegible] BWPH. (NO REPORT TO OCD)
188	11/20/[illegible]	Texaco	[illegible] #21	I	26-37-37					75		WATERFLOW @ [illegible] BWPH. (NO REPORT TO OCD)
189	11/[illegible]	Texaco	[illegible]	K	26-37-37					1000		WATERFLOW @ [illegible] BWPH. (NO REPORT TO OCD)

WATERFLOW INFORMATION

1. Pogo Producing Co. 9/30/92 ; Federal Red Tank 34 #1-34-22-32 Drilling 3000' Flowed 800 bbls - High in H2S, - Don Riggs 713-297-5045 10/23/92

2. Texaco Expl & Prod. 4-7-93; NMR NCT-3 #5- Drilling @ 1864' 90 BPH No other information available.

3. Texaco Expl & Prod. 4-9-93; Ellen Sims #9-3-23-37 Drilling @ 3049' Flowing 660 BPH @ 825# 4:00 AM -5-10-93 down to 440; 5/11/93 James Elliott down to approx. 70 BPH since 5-10-93 PM - setting 8 5/8" intermediate @ 3750'.

4 Texaco Expl & Prod. ; BF Harrison B #9 9-23-37 Drilling @ 1571' Flowed 1000 BPH Shut in Pressure 600#

5. Samedan; Sarah B #3-M 1-23-37 Drilling @ 1590' 600 BPH +-; Shut In Pressure 1000 Est. Vol 92000 +-.

6. Texaco Expl & Prod; R. R. Sims A #3 - 4-23-37; Drilling @ 2240' ; Flowed 80 BPH, Shut In Pressure 600 psi.

7. Texaco Expl & Prod: 11/24/93 - 9:00 AM; G. W. Sims #3- B - 9-23-37; Drilling @ 1444' Flowed 1200 BPH; Pressure 500 psi; Flowed down in 6 hours - 12-1-93 Drilling @ 5600', no further problems.

8. Texaco Expl & Prod; 5/17/94; WDDU #131 -32-24-38; Drilling @ 1420' ; Flowed 7 BPH @ 2000' 20 BPH.

9. Texaco Expl & Prod; 5/13/94; WDDU #146 - C 32-24-38; Drilling @ ?; Flowed 70 BPH.

10. Texaco Expl & Prod; 5/25/94; B F Harrison B #25 - C - 9-23-37; Drilling @ 2065'; Flowed 600 BPH; Shut In Pressure 875 down to 400 BPH @ 2:35 puff H2S down to 1 PPM @ 2:35 Drilling ahead.

11. Texaco Expl & Prod; 5-1-95; R.R. Sims B #1 - 4-23-37; Drilling @ 1709'; Flowed 390 BPH; Pressure not recorded 5/1/94 up to 800-1000 BPH - Flow heavy for approx 1 hour then slacks off - Drilling not delayed and drilling at 3282' approx. 7:45 AM 5/1/95.

12. Phillips Petro. Co.; 7/1/96; Hale 25 25-17-34; Drilling @ approx. 4800' - Poss hit earlier no pressure - 10 BPH up to 20 BPH and back to 10 BPH - com. Drilling set production casing 7/2/96.

13 Nearburg Prod. Co.; 10/6/97; Madura Federal #5 - E- 28-19-33; Drilling @ 8549 10-6-97; No record of pressure or volumes 100 BPH per Jack - Hit @ 1300' swedge and squeezed hit again 1900#.

14. Texaco Expl & Prod.; 10/25/97; State AN #12 ; Drilling @ 2985; No pressure recorded

60 BPH - down to 45 BPH @ 11 am - 10/27/97 Depth 3380' will set intermediate @ 3506.

15. John H. Hendrix 12/2/97; Boyd #7 - 23-22-37 Drilling; No pressure recorded 700 BPH.

TOWN	RANGE	SEC	UNIT/LTR	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	ANH TOPS
1	2	36	E	Estoranto Co	Summer 36	1		394'	
1	28	6	H	Diamondback Petro. Inc.	Cave St.	2	1788'-1508BWPD		
5	26	16	D	Yates Petro. Corp.	Paulerty PV ST	5			
5	26	34	E	Meadbourne Oil Co.	Prone Slope 34	1			
6	26	20	D	Yates Petro. Corp.	Hancock AHC Com.	3	28-30 bbls Hrs 9# Pond Flesh		
6	26	32	D	Yates Petro. Corp.	Tamarack DF St.	1		597'	
6	26	32	E	Yates Petro. Corp.	Tamarack DF St.	2			
6	26	32	E	Yates Petro. Corp.	Tamarack DF	3		718'	
7	22	1	P	Mesa Petro. Corp.	Haley Com.	2			
7	22	2	F	Enron Corp.	New Mexico CS St.	1		95'	
7	22	12	A	Yates Petro. Corp.	Haley Com.	3			
7	23	3	M	Yates Petro. Corp.	Baraton SN St.	1		919'	
7	23	8	M	Mesa Petro. Corp.	M.E.C. Com.	1			
7	23	10	L	Mesa Petro. Corp.	Round Top St.	6		480'	
7	23	20	O	Mesa Petro. Corp.	McKnight Com.	1		175'	
7	23	32	A	Yates Petro. Corp.	Rambler AGU St.	1			
7	24	8	J	Yates Petro. Corp.	Salmon Camy NR	1			
7	24	11	P	Yates Petro. Corp.	Red Bluff St.	1			
7	24	27	E	Yates Petro. Corp.	West Dixon NK St.	1			
7	24	36	P	Yates Petro. Corp.	Snakeweed SO St.	1			
7	25	2	P	Yates Petro. Corp.	Canelo BH St.	1			
7	25	7	C	YATES PETRO. CORP.	HILLTOP MQ ST	1			
7	25	11	A	Mesa Petro. Corp.	Burns Com.	2			
7	25	11	P	Mesa Petro. Corp.	Burns Com.	1			
7	25	17	P	Yates Petro. Corp.	Cocklebur RD	1			
7	25	23	A	Yates Petro. Corp.	Basil ANS	1			
7	25	27	I	Yates Petro. Corp.	Pappinto QI ST Com.	5			
7	25	30	F	Yates Petro. Corp.	Shink SK St.	4			
7	25	5	F	Mesa Petro. Corp.	Neal Com.	1			
7	26	6	B	Yates Petro. Corp.	Crandell UD	2			
7	26	16	K	Sanders Petro. Corp.	McKey Sweeden	2	1850'-20 BPM		
8	23	33	D	Yates Petro. Corp.	Middle Creek St.	1		65'	
9	23	5	K	Mesa Petro. Corp.	Ned St.	1			
9	23	5	O	Mesa Petro. Corp.	Ned St.	2		300'	
9	23	9	L	Mesa Petro. Corp.	Ned St	3			
9	23	11	H	Yates Petro. Corp.	Whipple ZH St	1			
10	25	2	H	Yates Petro. Corp.	Elickson KY	1		320'	
10	25	8	M	Yates Petro. Corp.	Hargrove AIH	1			
10	25	16	M	Yates Petro. Corp.	Bluer Lake FX St.	1			
10	25	17	C	Yates Petro. Corp.	Eakin AKB Com.	1			
10	25	17	H	Union Inc.	Cannon Fed	3			
10	25	17	H	Yates Petro. Corp.	Cannon XF	1		402'	
10	25	27	B	Yates Petro. Corp.	Unruh AFF	1	617' 16 20 BWPM Gyp Wtr 6000 Fp mlo		

TOWN	RANGE	SEC	UNIT LTR	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	FRM TOPS
11	24	18	J	Wallace oil & Gas Inc.	Hain	1			
11	25	3	M	Wallace OIL & Gas	Britt	1			
11	25	3	M	Wallace Oil & Gas	Britt	2	830' Fresh Wate		Hondo SA Perf. 858'-88'
11	25	4	F	Fred Pool Drlg co.	Hondo River Farm	1			
11	25	8	J	Wallace oil & Gas Co.	Peyton	1			
11	25	10	D	Wallace oil & Gas Co.	Marshall & Winston	1	W.F. @ 870' 5800Gal./Min. 2800ppmCl.		
11	25	20	F	Wallace oil & gas inc.	Perrine	1		800'	
11	25	29	F	William R. Mason	Stonell Com.	1			
11	26	14	L	YATES PETRO. CORP.	Mccaw bt	7	0	750	
12	23	28	E	Phillips Petro. Corp.	N.M. 28 St.	1		1032'	
12	26	3	L	Hanbery Oil Co.	Bogle	1	W.F. @ 35' .0625 Stream No Psi.		
12	26	3	L	Hanbery Oil co.	Bogle	1	1/16" Stream No PSI @ 35' Cmted off		
12	26	9	N	Petroit Corp.	Capt Johnson	1			Top S.A. 680'
13	26	35	J	Clemente Energy Inc.	New Mex. 35 St.	2			
14	24	9	I	The Superior Oil Co.	Ivy League Fee	1			
14	26	20	J	Clemente Energy Inc.	Bird	1y			
14	26	22	K	Southland Royalty Co.	Hagerman West 22	1			
14	26	23	M	Shenandoah Oil Co.	Rhodes	1			
14	26	33	E	Lyn Petro. Corp.	Drumm Com.	1			
14	26	33	G	Clemente Energy Corp.	Drumm Com.	1			
14	26	35	J	Clemente Energy Corp.	King 35 Com.	1			
15	25	28	F	Yates Petro. Corp.	Carol Jackson RD	1		900'	Top S.A.-802'.
15	28	32	F	Mesa Petro. Corp.	Mesa State Com.	2	1167'-800BPH Brine FLOW SI PSI 650#		
15	28	32	K	Mesa Petro. Corp.	Mesa State Com.	4	468' 150 BWPH		
16	17	6		J. Cleo Thompson	State A	6		AirDil	
16	30	5	J	Petro. Devel. Corp.	Maretino Fed.	1	2350' 8" Stream.		
16	30	9	C	Yates Petro. Corp.	Sidey PY Fed.	1	2737' 10BPM		
16	30	11		Yates Petro. Corp.	Strange "PZ" Fed.	1	2950' 3BWPM SI PSI 1350#		
17	17	35		J. Cleo Thompson	State A-3	1		412'	Open. LC @ 1210' Csg Was Set in Orig Bradi.
17	26	13	I	Yates Petro. Corp.	Aichen Frey DM	2			
17	26	14	H	Yates Petro. Corp.	McCaw BT	2		750'	
17	26	14	M	Yates Petro. Corp.	Morris Estate DC	5		723'	
17	26	14	P	Yates Petro. Corp.	Winters DM	4		740'	
17	26	15	P	Yates Petro. Corp.	Morris Estate DC	3		715'	
17	26	15	P	Yates Petro. Corp.	Morris Estate DC	7		715'	
17	26	22	H	Yates Petro. Corp.	J Lacy J	1			
17	26	23	I	Yates Petro. Corp.	Michell Jo	5			
17	26	23	K	Yates Petro. Corp.	Giesler AV	6			
17	26	23	M	Yates Petro. Corp.	Giesler AV	30			
17	26	27	A	Yates Petro. Corp.	Ingram Jackson BV	10			
17	26	36	O	Yates petro. Corp.	Powell DG	1			
17	26	38	I	Yates Petro. Corp.	Aloe ES St.	2			
17	26	10	F	Mewbourne Oil Co.	Sullivan	1			

TOWN	RANGE	SEC	UNIT	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	FRM TOPS
17	28	14	E	Mewbourne Oil CO.	Haldermas	1			
17	28	14	M	Mewbourne oil Co.	Vogel	1			
17	28	15	J	Texas Petro. Corp.	Cyrtell Fed. FD	2			
17	28	15	K	Medallion Prod.Co.	Lewis 15	1			
17	28	36	N	Balbala Forken	State 36	1			
17	28	27	J	Mallulu Energy Dev.	NG Phillips St.	25	494 BS*1.50Gal/Min.		
17	28	35	O	Mewbourne Oil CO.	State BX	1	670' 516 BWPD		
17	29	12	P	Marbob Energy Corp.	Burch Keely Ut.	1	2430		
17	30	1	A	Ray Wortall	Artesia Petro,Fed.	4	2385' 8000BPD w/psi-950#		
17	30	2	B	J.Cleo Thompson	Payne ST.	9	2530' 3" Stream		
17	30	10	I	Pinnler Oil & Gas Co.	Dale M. Parke "D"	2	2317' 1 1000BPD		
17	30	34	G	Anadarko Petro. Corp.	Arnold Fed. Com.	1	6185'284 BWPD		Glorieta 4700'-5000'
17	31	3	G	Devon Energy Corp.	H.E. West A	32	2549' 1 BPH		
17	31	3	J	Devon Energy Corp.	H.E. West "B"	76	33 BWPH @ 2550'		
17	31	3	L	Devon Energy Corp.	H.E. West B	33	2227' 14 BPH		
17	31	3	O	Devon Energy Corp.	H.E. West "B"	R6	18 BWPD @ 2637'		
17	31	4	E	Devon Energy Corp.	H.E. West B	73	2225' 7.50 BPH		
17	31	5	D	Devon Energy Corp.	J.L. Keel B	69	2800'-3000' 14 BPH		
17	31	5	N	Devon Energy Corp.	J.L. KEEL B	64	2910' 2.3 BPH		
17	31	8	B	Segmo Petro. Co.	J.L. Keel "B"	95	2500'-300BPH		
17	31	7	A	Devon Energy Corp.	J.L. Keel A	23	3000'-3100' 38 BPH		
17	31	7	H	Devon Energy Corp.	J.L. Keel A	99	3800' 50 BPH		
17	31	7	J	Devon Energy Corp.	J.L. Keel A	19Y	730' 10 #5 BPH		
17	31	8	F	Devon Energy Corp.	J.L. Keel B	90	3800' 23 BPH		
17	31	8	I	Devon Energy Corp.	J.L. Keel B	57	1297' 48 BPH		
17	31	8	J	Devon Energy Corp.	J.L. Keel B	78	3900' 17 BPH		
17	31	8	M	Devon Energy Corp.	J.L. keel B	93	1400' 3.8 BPH		
17	31	9	G	Devon Energy Corp.	H.E. West B	61	2568' 43 BPH		
17	31	9	O	Devon Energy Corp.	H.E. West B	81	3502' 2 BPH		
17	31	9	P	Devon Energy Corp.	H.E. West B	72	3300' 118 BPH		
17	31	10	B	Devon Energy Corp.	H.E. West B	66	3800'-4190' 33 BPH		
17	31	10	E	Devon Energy Corp.	H.E. West B	81	3598' 5 BPH		
17	31	10	F	Devon Energy Corp.	H.E. West B	60	3877' 16 BPH		
17	31	10	G	Devon Energy Corp.	H.E. West B	67	3513' 1.5 BPH		
17	31	10	I	Devon Energy Corp.	H. E. West "B"	70	4010' 1.50 BPH		
17	31	17	E	Devon Energy Corp.	Hudson Fed.	A	20-147 BPH @ 580'.		T.Rustler @ 367'T.Salado @ 500'B.Salado @ 1326'
17	31	17	M	DEVON ENERGY CORP.	TURNER B	116	2708'-60 BPH		
17	31	18	E	Devon Energy Corp.	C.A. Russell	15	4 BWPD @ 738'		
17	31	18	I	Devon Energy Corp.	Turner "A"	52	47 BWPD @ 1003'		
17	31	18	L	Devon Energy Corp.	Turner A	38	17 BWPD @ 2625'		
17	31	18	N	Devon Energy Corp.	Turner A	33	18 BWPD @ 2842'		
17	31	18	P	Devon Energy Corp.	Turner "A"	40	47 BWPD @ 1003'		
17	31	19	A	Devon Energy Corp.	Hudson Fed.	11	7 BPH @ 3040'		

TOWN	RANGE	SEC	UNIT/LTR	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	RIM TOPS
17	31	18	A	Devon Energy Corp.	Hudson Fed.	7	8 BPH @ 1905'		
17	31	18	A	Devon Energy Corp.	C.A. Russell	17	778'-809' 142 BWPH		
17	31	18	I	DEVON ENERGY CORP	TURNER A	55	22 BPH @ 2061'		
17	31	18	M	DEVON ENERGY CORP.	TURNER A	41	2578'-43 BPH		
17	31	18	N	DEVON ENERGY CORP	TURNER A	56	27 BPD @ 2611'		
17	31	18	O	Devon Energy Corp.	Turner A	42	2285' 21 BWPD		
17	31	18	O	DEVON ENERGY CORP	TURNER A	58	80 BPD @ 2696'		
17	31	18	P	DEVON ENERGY CORP.	TURNER A	44	758'-20 BPH		
17	31	18	P	DEVON ENERGY CORP.	TURNER A	45	803'-68 BPH		
17	31	19	H	Devon Energy Corp.	Turner "A"	50	482'9DBWPD, 1186'200BWPD, 1388'240BPD		
17	31	19	I	Devon Energy Corp.	Fem Oil Co.	24	14 BWPD @ 1440'		
17	31	19	C	Devon Energy Corp.	Turner A	46	61 BWPH @ 1675'		
17	31	19	G	Devon Energy Corp.	Turner A	45	34 BPH @ 1320'		
17	31	19	G	DEVON ENERGY CORP	TURNER A	57	81 BPD @ 1614'		
17	31	19	F	Devon Energy Corp.	Turner A	48	42.6 BWH @ 1326'		
17	31	19	G	Devon Energy Corp.	Turner A	49	800' 143 BWPD		
17	31	19	H	Devon Energy Corp.	Turner A	47	3.0 BPH @ 1050'		
17	31	19	J	Devon Energy Oper. Corp.	Turner A	51	1402'-1408' 71 BWPH		
17	31	19	J	DEVON ENERGY CORP	FRESS FED	4	172 BPD @ 718'		
17	31	20	M	DEVON ENERGY CORP	TURNER A	118	57 BPD @ 882'		
18	25	10	L	Yates Petro. Corp.	Thistle AKF	1		693'	
18	25	34	K	Yates Petro. Corp.	Rio Penasco RT	2		770'	
18	26	1	D	Barbra Fasken	Higgins Trust "1"	1			
18	26	18	M	Yates Petro. Corp.	West Dayton A JR	1		765'	
18	26	18	A	Yates Petro. Corp.	Vandiver Oil Com.	2		894	
18	26	22	H	Yates Petro. Corp.	Lawrence ADZ	2			
18	26	22	M	Yates Petro. Corp.	Payton Fz	2		60'	
18	26	28	C	Yates Petro. Corp.	Dayton FN	2			
18	26	34	C	Yates Petro. Corp.	Allied Lee ABH	2			
18	26	34	C	Yates Petro. Corp.	Allied Lee ABH	2			
18	26	34	C	Yates Petro. Corp.	Allied Lee ABH	2			
18	27	7	K	Devon Energy Corp.	West Red Lake ut.	56			
18	27	7	D	Devon Energy Corp	West red Lake UT	39			
18	27	7	F	Devon Energy Corp.	West Red Lake UT	37			
18	27	7	F	Devon Energy Corp.	West Red Lake UT	52			
18	27	7	I	Devon Energy Corp.	West Red Lake UT	38			
18	27	7	O	Devon Energy Corp.	West Red Lake UT	42			
18	27	26	H	SDX Resources Inc.	Artesia Mobil	54			
18	28	8	A	Anderko Petro. Corp.	Railroad 08 AU TR. 5	15	1385' 214 BPH SI PSI 180A		
18	28	22	G	Primier Oil & Gas Co.	Yates Primier Fed.	3	1568' 108 Brine		
18	29	22	K	HW Inc.	Empire 22 Fed Com.	1	960' 28000 BWPD		
18	29	22	K	Ray Westall	Denton Fed.	6	938' 5000 BPD		
18	29	22	O	Premier	Yates Premier Fed.	1	1543' 10 GW /Min.		

TOWN	RANGE	SEC	UNITLTR	OPERATOR	PROP_NAME	WELL_NUM	WTR_FLOW	LOST_CIR	FRM_TOPS
18	30	2	N	MEWBOURNE OIL CO.	LOCO HILLS ST.	4	1616 3BPM 450 SI PSI PREMACKISM WTR		
18	30	2	O	Mewbourne Oil Co.	Cadet Paaske St. 2	5	838 40 BWPH SI PSI 350# 10.8 Brine		Salt Section 720'-1500'
18	24	4	N	Yates Petro. Corp.	Rancherita AAH St. Com.	1		79'	
19	24	33	E	Yates Petro. Corp.	Agave AAJ St.	3		90'	
18	26	4	O	Yates petro. Corp.	Bradshaw	2			
19	25	4	O	Anadarko Petro. Corp.	Bradshaw	2			
19	25	8	I	Yates Petro. Corp.	THOMAS AJJ	4		470'	
19	25	8	I	Yates Petro. Corp.	Thomas AJJ	6			
19	25	8	J	Yates Petro. Corp.	Thomas AJJ	3			
19	25	8	P	Yates Petro. Corp.	Roy AET	5			
18	25	8	[illegible]	Yates Petro. Corp.	Marshall Aph	1			
18	25	9	F	Yates Petro. Corp.	Marshall APH	1			
18	26	8	E	Yates Petro. Corp.	Marshall APH	1			
18	25	8	G	Yates Petro. Corp.	Patrick API	2			
19	25	16	C	YATES PETRO. CORP.	APARJO APA ST COM.	6		61'	
19	25	15	D	Yates Petro. Corp.	Aparejo AMP	1			
19	25	16	K	Yates Petro. Corp.	Anolis Amm St. Com.	2			
19	25	17	K	Conoco Inc.	Baldwin 17	17			
19	26	20	H	Yates petro. Corp.	Hopper AMP	3			
19	26	20	M	Yates Petro. Corp.	Fairchild AIC Com.	1			
19	25	21	E	Yates Petro. Corp.	Hopper AMP	2			
19	25	21	M	Yates Petro. Corp.	Parrot AIZ	10		384	
18	26	24	E	Nearburg Prod. Co.	Fairchild 24	1		55'	1" from 100' to 66' Pose. void 400' 100' Oper. wil
18	25	27	E	Nearburg Prod. Co.	South Boyd 27	3			
18	26	27	L	Nearburg Prod. Co.	South Boyd 27	4			
19	25	28	B	Yates Petro Corp.	Hinkle ALD	2		410'	
18	25	28	G	Yates Petro. Corp.	Hinkle AKI	1		63'	
18	26	28	J	Yates Petro. Corp.	Tackit AQT	1		347'	
18	26	28	J	Nearburg Prod. Co.	State K	2		190'	
19	25	28	O	Yates Petro. Corp.	Tackit AQT	3			
18	26	29	O	Yates Petro. Corp.	Wright AJD Com.	1			
19	25	32	A	Conoco Inc.	Savannah St.	1			
19	25	32	A	Conoco Inc.	Savannah State	1		366'	
19	25	33	A	MEWBOURNE OIL CO	STATE B	2			
19	26	18		Nearburg Prod. Co.	Lakewood Farms 18	1			
19	26	1	B	Bass Enterprises Production Co.	Merchant State	3	1390' 146 BWPH 10# Brine 200#S. PSI		
19	30	14	K	Texaco Explo. & Prod. Co.	Remuda Basin St.	2			Top Salt 837' Base Salt 2875'
20	24	1	A	Yates Petro. Corp.	Foster AN	3			
20	24	1	H	Yates Petro. Corp.	Foster AN	1		825'	
20	24	1	G	Yates Petro. Corp.	Mobil ADB	1		247'	
20	24	2	H	Yates Petro. Corp.	Candelilla AKD	2			
20	24	11	F	Yates Petro. Corp.	Sara AHA Com.	6		308'	
20	24	14	I	Yates Petro. Corp.	John AGU	5			

TOWN	RANGE	SEC	UNITLTR	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	FRM TOPS
20	24	21	A	Yates Petro. Corp.	Albert AJH	1		62'	
20	24	22	C	Yates Petro. Corp.	Carl TP	3			
20	24	24	D	Nearburg Prod. Co.	Mayer 24	2		174'	
20	24	25	E	Yates Petro. Corp.	Charlotte Mckay Com.	4		185'	
20	24	25	L	Yates Petro. Corp.	Kinle ALA	1		172'	
20	24	26	A	Yates Petro. Corp.	Conoco AKG FED.	4		179'	
20	24	36	M	Marathon Oil Co.	Indian Hills St.	8		86'	
20	24	36	K	Marathon Oil Co.	Indian Hills St.	1		45'	
20	28	8	O	Chi Oper. Inc.	Savage	1			No salt section 360-1000 No capitan reef sec. 8
20	28	30	F	Exxon Corp.	Avalon Delaware UT	222			
20	28	32	E	EXXON CORP.	AVALON DELAWARE UT.	2220			
20	28	32	L	Exxon Corp.	Avalon Dela. Ut.	2420		1700'	
21	22	32	O	Premier Oper. Co.	Fanning Draw St.	1		Air Dr	Water 1390'-1490' hole full of water, Fluid level 80'
21	23	1	J	Marathon Oil Co.	N. Indian basin Ut.	10		Airdril	
21	23	1	M	Marathon Oil Co.	N. Indian Basin Ut.	12		Airdril	Fresh Water @ 218', Brackish Water @ 710'
21	23	2	O	Marathon Oil Co.	N.Indian Basin Ut	11		500	
21	23	16	A	Marathon Oil Co.	North Indian Basin Ut.	8		148	
21	24	36	M	Mitchell Energy Corp.	Indian Hills 36	1		117'	
21	26	9	E	Chi Oper. Inc.	Wiser St.	3		420	
21	26	9	F	Chi Oper. Inc.	OXY St.	2		1448	
21	26	9	K	Chi Oper. Inc.	OXY St.	1		650	B. Capitan-2130
21	26	9	N	Chi Oper. Inc.	Wiser Com.	5		448	
21	26	16	F	Devon Energy Corp.	Cactus State	8			
21	26	16	I	Devon Energy Corp.	Cactus State	10		1270'	
21	26	16	O	Devon Energy Corp.	Cactus St.	4			
21	26	16	O	Devon Energy Corp.	Cactus State	5			
21	26	16	A	Devon Energy Corp.	Cactus St.	12		770'	
21	26	16	B	Devon Energy Corp.	Cactus State	7		490'	
21	26	16	C	Devon Energy Corp.	Cactus St.	1		650	
21	26	16	D	Devon Energy Corp.	Cactus State	5			
21	26	16	E	Devon Energy Corp.	Cactus State	8			
21	26	16	G	Devon Energy Corp.	Cactus St.	3		78'	
21	26	16	G	Devon Energy Corp.	Cactus ST.	3		443'	LC-78'
21	26	16	J	Devon Energy Corp.	Cactus State	6			
21	26	16	K	Devon Energy Corp.	Cactus St.	4			
21	27	9	D	Ray Westall	Myrtle Myra	5			Capitan Reef 1248-1718
21	27	16	A	Ray Westall	Myrtle Myra	8			
21	27	17	F	Yates Petro. Corp.	Cinder AG St.	1		1264	
21	28	3	K	Energex Oil Co.	Teodoro St.	1			Capitan Reef 1360 2106
21	28	3	M	Pogo Prod. Co.	State	1		1359	
21	31	36	P	Pogo Prod. Co.	State 2	1			
21	31	36	P	Pogo Prod. Co.	State 2	1			
22	23	3	M	Oryx Energy Corp.	Conoco St. Gas Com.	2		542'	

TOWN	RANGE	SEC	UNITLTR	OPERATOR	PROP NAME	WELL NUM	WTR FLOW	LOST CIR	FRM TOPS
22	23	16	D	Chevron USA Inc.	Eagle Flats UT	16			
22	23	32	G	Yates Petro. Corp.	Wagon Ut.	1		835'	
22	24	2	K	Nearburg Prod. Co.	Big Walt 2 St.	3			
22	28	32	A	Louis Dreyfus Nat. Gas	E.V. State	1			
22	30	34	A	Enron Oil & Gas Co.	James Ranch Ut.	71			Base Salt 3588'
22	30	36	K	Bass Enterprises Prod. Co.	James Ranch Unit	20			Base Salt - 3808'
22	30	36	N	BASS ENTERPRISES Prod. Co.	James Ranch Ut.	41			Base Salt-3884'
22	31	1	A	Yates Petro. Corp.	Graham AKB St.	1			B. salt 4073'
22	31	2	H	Yates Petro. Corp.	Graham AKB St.	2			
22	31	2	I	Pogo Prod. Co.	State 2	3			Base Salt 4100'
22	31	2	J	Pogo Prod. Co.	State 2 #4	4			Base Rustler @ 700'. Top Salt @ 800'.
22	31	2	K	Yates Petro. Corp.	Flora AKF State	2			Base Salt 4020'
22	31	2	N	Yates Petro. Corp.	Flora AKF St.	1	2032' flowed 25-30 bbl/Hr. w/H2S Svs.		
22	31	2	O	Pogo Prod. Co.	State 2	2	120BPH @ 3087' flowed to 0 10 Hrs.		
23	28	24	A	B.K. Oper. Corp.	Bermuda Basin St.	2			Base Salt 3001'.
23	30	19	C	Texaco Expl. & Prod. Inc.	Bermuda Basin 19 Fee	1			Base Salt 3328'
23	31	16	C	Yates Petro. Corp.	Medano VA St.	16			Base Salt-3913
23	31	32	E	Enron Oil & Gas Co.	Poker Lake 32 St.	9			Base Salt 3840'
24	25	8	C	W.A. Moncrief Jr.	Jurnegan St.	1			
24	25	8	K	W.A. Moncrief Jr.	Jurnegan St.	2		1005'	Top Delaware-2784'
24	26	9	B	Santa Fe Energy	Mosley Canyon 9 St.	1		1070'	Base Capitan Reef-2484
24	26	10	C	HNG Oil Co.	S. Horseshoe Bend 10	1		1272'	
24	26	17	C	R.E. Hebbert	Ridge St	1		939'	
24	26	17	D	Santa Fe Energy	Lambchop 17 St. Com.	1		1533	Base Capitan Reef 2279'
24	25	20	B	Santa Fe Energy	Lambchop 20 Fed Com.	1		2090	Top Capitan Reef 845', Base Capitan Reef 2385'