



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

**16 MAY 2002**

Mr. Frank Marcinowski  
Office of Radiation and Indoor Air  
Environmental Protection Agency  
Center for Federal Regulation  
Ariel Rios Building  
1200 Pennsylvania Avenue, N. W.  
Washington, D. C. 20460

Dear Mr. Marcinowski:

This letter is to request approval from the Environmental Protection Agency (EPA) of a proposed change in the schedule to submit detailed plans and drawings on the passive institutional controls (PICs) permanent marker prototype designs for the Waste Isolation Pilot Plant (WIPP). This request provides a proposed revised schedule and the justification to support the schedule change. The new schedule will allow the Department the additional time needed to refine the permanent marker design and testing program. Also we will be testing a set of potential markers that more closely resemble the final permanent marker design. We believe this delay is necessary in order to ensure effective testing of the permanent marker designs in the time period specified in Condition 4 of WIPP's EPA certification.

Our evaluation of the EPA WIPP Docket A-93-02 containing the compliance baseline has determined that this delay does not differ significantly from the information in the most recent compliance application. Additionally, we are providing two notebooks. Each one contains reasons for the proposed change in schedule, a proposed new schedule for the permanent marker testing program activities, and three supporting documents.

If you have any comments or questions, please contact Mr. Harold Johnson at (505) 234-7349.

Sincerely,

Dr. Inés R. Triay  
Manager

Enclosure

cc: w/o enclosure  
H. Johnson, CBFO  
S. Casey, WTS

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## **Passive Institutional Controls – Permanent Marker Test Program Proposed Schedule Change**

### **Introduction**

In 1996, the Department of Energy submitted plans to the Environmental Protection Agency on the construction of permanent markers [DOE/WIPP 1996-2184, Compliance Certification Application (CCA)]. These markers provide a major contribution to the passive institutional controls (PICs) system that will warn future generations of the potential threat of the waste buried 2150 feet below the surface. The proposed system of PICs also includes archiving of documents containing information about WIPP, and distribution of awareness triggers. The focus of this change request is the schedule for the permanent marker designs.

The permanent marker conceptual design identified in Appendix PIC of the CCA, was developed from the insights of several planning and strategy teams representing a multidisciplinary approach. These teams evaluated potential scenarios and produced key concepts to warn future generations about the dangers of the radioactive waste buried nearly a half mile below the surface. The combined efforts resulted in the designs and strategies for implementing the permanent marker system, as approved in the Certification Final Ruling [FR, May 18, 1998]. The DOE position, at the time this information was submitted, stated that the designs were still concepts, and not the intended final designs. The EPA, agreed that the designs were not fully mature, and requested that the DOE provide more information confirming that the proposed permanent marking system could be successfully emplaced once the repository was sealed. In response, the DOE-Carlsbad Area Office submitted a plan and schedule showing how the conceptual designs would evolve into an effective final system of designs. This schedule listed activities that would be performed during the 35-year operational period and after site closure.

### **Change Request**

In response to Condition 4 of the EPA certification, a new schedule is being developed to accelerate the design, testing, and emplacement of the permanent marker system. Since the schedule for the proposed approach differs from the schedule for permanent marker design and testing submitted in conjunction with the CCA, the DOE is seeking EPA agreement to update the schedule to reflect the proposed changes. This change in schedule is being requested for the following reasons:

- Portions of the permanent marker system originally conceptualized (e.g. the granite monuments) are impractical, thus more suitable designs must be engineered
- Materials studies conducted since WIPP was certified suggest that substitution of different materials other than those originally proposed for use in the permanent marker system could decrease the cost of the system without compromising performance (see section entitled *Completed Activities*)
- Condition 4 (of the EPA Final Certification Decision) requires the fabrication and emplacement of the final permanent markers as soon as practical after WIPP closure.

DOE's previous schedule allowed a longer time for testing after closure and prior to fabrication to capture a wide range of potential weathering impacts. In consideration of a shortened testing duration, DOE's plan for testing the permanent markers needs to be realigned to ensure adequate testing and evaluation of the long-term performance of the system of markers can be accomplished. A condensed testing period dictates that design changes and material substitutions be made, if warranted, before long-term testing begins so that the prototype design being tested bears as close a resemblance as possible to the final design.

- Finally, DOE plans to re-examine whether all of the components of the permanent marker system proposed in the CCA are needed. The redesign effort could produce a less elaborate system of permanent markers that is still adequate to meet the requirements.

The primary objectives of this test program are to maximize the effectiveness of the designs and to devise a permanent marker system that continues to meet the requirements of the EPA regulations. The schedule related to the permanent markers program, as submitted in connection with the CCA, is provided in Table 1 along with a revised listing of the proposed completion dates. The schedule for the modified Permanent Markers Testing Program completes all testing activities by 2033, so the markers can be installed as soon as possible after site closure.

DOE does not propose that any of the activities in Table 1 be cancelled or significantly altered. The proposed changes are specific to completion dates. Thus, it is the opinion of DOE that these proposed schedule changes do not constitute a "significant change" as described in Title 40 CFR Part 194.4(b)(3). The changes are being pursued to ensure that the Permanent Marker Testing Program produces useful results that will yield more effective designs, within the required timeframe.

DOE anticipates having the detailed plans and drawings ready to submit to EPA by the end of 2007. Reasons for this delay are explained in the next section, entitled *Future Activities*. If the testing program results in material substitution or changes the permanent marker system design, such changes will be provided to the EPA with the 2007 Annual Change Report submittal.

**Table 1. Activities Related to the Implementation of the Permanent Markers Program**

Activity	Reference Event	Original Timeframe	Current Status	Proposed Timeframe
Stone Monument Survey	1 <sup>st</sup> 5 years of operations	1999-2004	Completed	N/A
Identification of suitable source material	1 <sup>st</sup> 5 years of operations	1999-2004	Pending changes to design and material selection	2007
Submit plans for the test marker system	1 <sup>st</sup> CRA Submittal	2003	Proposed change to submit prior to 2 <sup>nd</sup> CRA	2007
Construct and test berm and test markers	2 <sup>nd</sup> 5 years of operations	2004-2009	Pending proposed change and testing program	2008
Monitor performance of test berm and test markers	After construction	2007-2083	Pending proposed change and testing program	2009 – until closure
Test comprehension of marker messages submittal of testing plans to EPA	4 <sup>th</sup> CRA submittal	2018	No change	N/A
Develop final design of markers	Upon termination of testing program	2083-2090	Final design to be submitted with the final CRA	2033 (anticipated)
Finalize Translated Messages	Prior to building of final permanent markers	N/A	Finalized messages will be submitted with the final CRA	2033 (anticipated)

### Future Activities

As referred to in Table 1, the information on PICs-permanent markers (provided to the EPA in 1997) contained a schedule of activities to be performed prior to the construction of the permanent markers, or implementation of the other PICs.

Based on comments from the EPA, the Department believes it needs to take an expedited approach to the testing of the permanent markers. The initial testing program will analyze the candidate materials, evaluate human cognition factors, and utilize computer modeling for long-term weathering impacts and major impact events (e.g. earthquakes, 100-year floods, etc.). Such modeling will most likely have to be updated and enhanced as the actual design is produced.

Once permanent marker designs are specified and configured within a computer modeling program, DOE can perform an analysis of the current design, incorporate modifications of materials and/or design, and perform analyses of alternative design approaches. Based on the alternative schedule, the final long-term test plans and designs should be ready in 2007. At that time, DOE will decide whether to build full-scale or reduced-scale prototypes of the markers for long-term testing. Table 2 presents a schedule of planned activities for the proposed test

program. DOE has based the revised Permanent Marker Testing Program on the assumption that the proposed changes can begin in January 2003.

**Table 2. Schedule of Activities for the Permanent Markers Testing Program**

Activity	Duration (months)	Expected Completion
Computer Modeling (several phases)	40	2008
Cognition Experimentation	14	2004
Material Testing	9	2003
Bench Scale Design	62	2006
Design Evaluation and Determination	30	2006
Long Term PM Program Plan	12	2007
Final Design of Scale Models of Prototype (Option 1)	21	2007
Final Design of Full Scale Models of Prototype (Option 2)	12	2007
Completion of Prototype Construction	37	2011
Long Term Test Program (to begin after construction)	241	2031

### Completed Activities

Results from activities completed since 1998 support the proposed changes within this request. As committed to in a response to the EPA's request for additional information (EPA Air Docket A-93-02, Item II-I-07, DOE, 1997) the DOE has followed through on examining issues related to the final design of the permanent markers. In late 2000, the DOE Carlsbad Area Office completed the following: 1) surveyed monuments within a wide radial distance from WIPP; 2) examined materials chosen for the permanent marker conceptual designs; and 3) produced a plan for the Permanent Marker Testing Program. The monument survey, materials analysis, and testing plan are summarized in following paragraphs.

### Monument Survey

Originally, the DOE committed to performing a survey of monuments within a 150-mile radius of the WIPP facility to evaluate the environmental effects on various types of granite. However, due to the lack of comparable archeological sites with structures constructed from rock or granite, the survey area was extended to include any sites within New Mexico or Texas containing compatible archeological information. The focus was to gather data that could be used to improve the design of the permanent markers containing granite or other rocks with a climate and elevation similar to that at WIPP.

As the southwest portion of the country contains very few ancient dwellings constructed of long lasting materials, it was determined that the best information could be gathered from the messages left behind. The messages inscribed or pecked into the rock surface are often called "petroglyphs." Site selection criteria were established to ensure that the most useful information could be obtained from each visit.

The criteria limited eligibility to sites:

- that provide inscriptions on durable rocks;
- that contain inscriptions at least 600 years old;
- at elevations able to support piñon and juniper trees, but low enough that temperatures and moisture are comparable to the climate projected for the WIPP; and
- that have not undergone major restoration

At each site, information on the inscriptions was recorded. This included the rock type, physical features, depth and width of inscription, estimated inscription age, and any other information that could provide qualitative significance. Results of these surveys can be found in the contractor report entitled, Permanent Markers Monument Survey [WIPP UN001208, John Hart & Associates, 2000]. Conclusions reached from this survey support the need for testing and refining the design and selection of proper materials for the permanent marker system.

#### **Materials Analysis**

The materials proposed for use in the berm or the other permanent markers have come under a great deal of scrutiny. For example, the use of mined salt as a core material in the berm is subject to validating that the core will not be exposed to elements that could degrade the soluble halite. Even if this is proven likely, the use of the salt material is dependent on meeting performance requirements (such as those from the American Society of Testing Materials, ASTM) to qualify as an adequate material for berm construction. An analysis of the various candidate materials was performed and published in the report Permanent Markers Materials Analysis [WIPP UN001206, John Hart & Associates, 2000]. Results of the analysis support future testing and provide recommendations on the types of tests that might lead to the most practical information. It is expected that the testing of the candidate materials will provide quantitative information for selection of final construction-grade materials.

#### **Testing Plan**

The Department has issued a programmatic plan to guide the process of moving from a conceptual design to a final design. The Permanent Markers Testing Program Plan [DOE/WIPP 00-3175, DOE 2000] examines system components and ensures that adequate materials and designs are engineered for the long-term testing phase. This Plan will serve as an upper-level decision guide for the long-term testing program, and will be updated through out the life of the program.

Copies of these three documents have been provided as part of this change request.