THE DOE ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT OPERATIONAL READINESS REVIEW OF THE WASTE ISOLATION PILOT PLANT

Don Carrell and Rick Chavez
Westinghouse Electric Corporation
P.O. Box 2078
Carlsbad, NM 88220

ABSTRACT

The purpose of this paper is to briefly describe the Department of Energy (DOE) Office of Environmental Restoration and Waste Management (EM) Operational Readiness Review (ORR) of the Waste Isolation Pilot Plant (WIPP). Included in this paper is the process used by the Westinghouse Waste Isolation Division (WID) used to support the DOE EM review and resolve pre-start and post-start findings.

BACKGROUND

Facility Background

Public Law 96-164, 1979, authorized the WIPP to initiate activities for demonstrating the safe underground storage/disposal of transuranic (TRU) waste. The WIPP has been designed to receive and retrievably store U.S. defense TRU waste. The WIPP site is located in the southeastern corner of New Mexico about 26 miles east of the city of Carlsbad. The WIPP waste storage horizon is at a depth of 2150 feet below the surface, in about the center of a 3,000-foot thick bedded salt formation.

The WIPP is considered a low hazard facility, as documented in Chapter 1 of the WIPP Final Safety Analysis Report (FSAR). From a health, safety and environmental impact perspective, the facility represents a negligible hazard to the general public and occupational worker. The WIPP is not required to operate with any safety class systems as defined in DOE 6430.1A, General Design Criteria. The WIPP is a new facility and has not yet received any radioactive waste; therefore there is no residual radioactivity on site. However, the future of operations at the WIPP will bring significant quantities of TRU waste to the facility. Therefore, it is important that operations at the WIPP be managed such that a safety culture is intrinsic to all daily activities.

The Test Phase is a planned five-year program to test the behavior of TRU wastes under simulated long-term storage conditions in the 2,000 foot deep WIPP repository. The testing is required by the Environmental Protection Agency's November 14, 1990 Conditional No Migration Determination (NMD) for the WIPP, the WIPP Land Withdrawal Bill, 1992, and will provide data to be used in assessing the long term performance of the repository. The NMD was required as a variance to portions of the Resource Conservation Recovery Act land disposal restrictions and the performance assessment is required by the Environmental Radiation Protection Standards For Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191. The tests consist of studying waste behavior and gas generation of small quantities of representative wastes in specially designed containers (bins). Bins will be placed in retrievable underground storage waste boxes where they will be carefully instrumented and studied.

Review Background

DOE-EM conducted the EM ORR of the WIPP during the summer of 1991. The review was conducted in response to the Defense Nuclear Facilities Safety Board (DNSFB) Recommendation 91-3, "DOE's Comprehensive Readiness Review Prior to Initiation of the Test Phase at the WIPP." The DNFSB recommended that DOE conduct a comprehensive, independent ORR of the facility prior to authorization and initiation of the Test Phase. The review primarily focused on activities applicable to the facility Managing and Operating Contractor, WID, which is responsible for managing all matters relating to health, safety, and protection of the environment. In addition, activities applicable to Sandia National Laboratories (SNL), the test program technical advisory contractor, transportation, waste preparation at generator sites, and DOE management integration were reviewed. The review included the observation of the WID's Integrated System Check-out (ISC), a demonstration of bin shipment from Idaho National Engineering Laboratories (INEL) to the WIPP (including loading, unloading, and emplacement of empty bins in the WIPP underground), emergency drills, and accidental release off-site dose assessment drills.

The successful completion of the ORR and the response and closure of resulting priority findings contributed to the Secretary's operational readiness proclamation for the WIPP. The DNFSB in turn determined, at that time, that no further recommendations were necessary to ensure public health and safety at the WIPP. The review was overseen by the New Mexico Environment Department, the Environmental Evaluation Group, the DNFSB, the DOE Office of Environment, Safety and Health, and the DOE Office of Nuclear Safety.

EM ORR PROCESS

Purpose of Review

The purpose of the EM ORR process was to verify WIPP's safety, health, environmental compliance and management readiness to package, transport, and receive limited quantities of TRU waste for the Dry Bin Scale Test Phase.

Scope of Review

The EM ORR included each facility or organization directly involved in the WIPP mission, including the WIPP Facility, DOE-Albuquerque (DOE-AL) and the WIPP Project Site Office (WPSO), the WIPP transportation system, and the waste shipment preparation facility at the INEL site (origin of the first waste shipments). The review included the evaluation of management interfaces between organizations and the assessment of previous reviews and audits to ensure that all findings affecting safe start-up were satisfactorily resolved. The review included the following elements outlined in the ORR main report:

- Assessment of the adequacy and correctness of waste handling and utility systems for normal and abnormal operating and emergency procedures;
- Assessment of level of knowledge achieved during operator qualification as evidenced by review of examination questions and examination results, and by selective oral examinations of operators by members of the review team;
- Assessment of Conduct of Operations by observation of actual waste handling operations using simulated waste containers, and the response to simulated abnormal and emergency situations;
- Assessment of the interrelationships and the delineation of roles and responsibilities among the various DOE (EM, WPSO, and AL) and contractor (WID and SNL) organizations involved in the Test Phase;
- Examination of records of tests and calibration of safety systems and other instruments monitoring Limiting Conditions of Operation (LCOs) or that satisfy Operational Safety Requirements (OSRs);
- Verification of safety system as-built drawings by walk-down of selective systems;
- Assurance that the unique needs of the WIPP have been properly communicated to waste generators and shippers, and that a high level of confidence has been developed that wastes arriving at the WIPP will meet receipt requirements;
- Assurance that the FSAR and Addendum is consistent with the as-built plant, is current with existing procedures and staffing, has been reviewed and approved by appropriate individuals and organizations, and that it properly identifies potential hazards for personnel protection and emergency planning purposes;
- Assurance that chains of command back to DOE-HQ are clearly defined and unambiguous, that personnel are aware of their responsibilities and reporting chains, and that the management systems are being implemented effectively;
- Determination that viable Quality Assurance and Configuration Management programs for the WIPP facility, for the WIPP unique transportation system, and the waste shipping facilities are in place and tested;
- Assurance that programs are in place and are being effectively utilized for self-assessment, lessons learned, and operating experience at the WIPP and its associated facilities;
- Assurance that all tests and prerequisites for each facility or function to be used in the shipping, receiving, and handling of TRU waste during the Test Phase of operations have been successfully completed, and any deficiencies corrected and/or any lessons learned incorporated;
- Assurance that the Radiological Protection Program and organization are adequate to support safe waste handling operations;
- Assurance that the Dry Bin Scale Test Phase Plan can be conducted in accordance with safety, health, and environmental requirements.

The EM ORR served as an indirect measure of WIPP compliance with selected Level-1 DOE Orders that apply to safety, environmental protection, safeguards and security. The objectives and sub-objectives corresponding to each order were used.

Review Team

The EM ORR was conducted by a 25-member ORR team with expertise in management, engineering, science, nuclear facility safety, and TRU handling operations. The team structure was as follows:

- DOE-EM Team Leader
- DOE-EM Deputy Team Leader
- 3 Independent Senior Advisors
- Senior (supervisory) level Technical Experts in the following areas:
  - Environmental Compliance
  - Operations
  - Mine Safety
  - Maintenance
  - Quality Assurance
  - Training
  - Emergency Preparedness
  - Fire Protection
  - Radiological Protection
  - OSHA Compliance
  - TRU Waste Handling
  - Transportation
  - Technical Writer/Editor

The Team Leader was responsible for the selection of EM ORR team members, provided guidance to each team member, functioned as liaison with the WID, SNL, DOE-AL, the WPSO, and WIPP oversight groups and submitted EM ORR reports to senior DOE officials.

The Deputy Team Leader was responsible for assisting the Team Leader. He also provided knowledge of DOE safety-related orders and other requirements in support of the Team Leader, Senior Advisor, and Technical Experts.

Senior Advisors were responsible for providing technical support to the team leader, guidance to the Technical Experts, identified issues to be addressed during the EM ORR, approved the criteria and review approaches to be used by the Technical Experts, assisted the Team Leader in preparing the final report, and signed the final report. They worked in conjunction with the technical experts to establish the team's objectives and sub-objectives, *to define specific* issues to be addressed by the Technical Experts, and to assist the Technical Experts in developing the Criteria and Review Approaches (CRAs) for their areas of review.

Technical Experts were responsible for assessing the adequacy of the WIPP facility, transportation system, and waste generators for readiness to receive and handle TRU waste in their assigned areas. They developed objectives, sub-objectives, criteria and review approaches. The Technical Experts assisted the Team Leader and the Senior Advisors in defining the scope of review in their assigned areas, documented the

associated criteria and review approaches, and documented their own findings and conclusions.

Pre-Assessment Visit

A pre-assessment visit to the site was conducted approximately one month prior to initiation of the review. Six team members including the Team Leader and Deputy Team Leader participated in the visit. The purpose of the visit was to become familiar with site documents (FSAR, Supplemental Environmental Impact Statement [SEIS], plans, manuals, and procedures) and technical issues in order to develop the implementation plan with scope and objectives, sub-objectives and the criteria and review approaches for each objective and sub-objective. This visit enabled the core team to be in a position to effectively focus the review on the key technical and functional ares. Part of this team conducted a pre-assessment visit to develop the implementation plan containing the ORR objectives and sub-objectives and criteria and review approaches for each objective and sub-objective.

Review Approach

The review was conducted utilizing the criteria and review approach. The criteria provide defined bases for conducting the review within the context of the safety objectives. The approach delineated the method used in evaluating the criteria.

The objectives were divided into four broad categories: hardware (H), personnel (P), management (M), and functional (F) which included WIPP programs and procedures. The objectives were further broken down into sub-objectives to focus the review on the specific aspects of operations required to meet the objectives. The objectives used to evaluate WIPP readiness are listed below:

- **Plant and Equipment (Hardware) Readiness**
  - H.1 The structures, systems, and components that are important to safe waste handling operations are properly identified, available, and sufficient and are consistent with the assumptions about such systems in the FSAR.
  - H.2 The readiness condition and operability including maintenance and surveillance needed to assure continued operability of systems important to safe waste handling operation is confirmed.
  - H.3 There are adequate procedures, OSRs, and LCOs to operate the systems important to safe waste handling operations.
  - H.4 Adequate facilities and equipment are available for operational support services.
  - H.5 The underground facility and associated mining systems and operations are adequate to ensure the health and safety of operating personnel, and protection of the environment during the Dry Bin Test Phase.
- **Personnel Readiness**
  - P.1 There are sufficient numbers of properly qualified operations personnel, supervisors and managers to support the safe initiation of the Dry Bin Test Phase.
  - P.2 Sufficient qualified personnel are provided for operational support services, including emergency preparedness, engineering support, environmental protection, fire protection, maintenance, quality assurance, radiological protection, security, training, and worker safety and mine safety.
  - P.3 All facility personnel exhibit an appropriate awareness of safety and environmental protection requirements and through their actions, demonstrate a commitment, ability, and fitness to comply with those requirements.
- **Management Readiness**
  - M.1 A formal and well understood program is established to develop a WIPP site-wide culture that places the highest priority on safety and protection of the environment, formality and discipline of operations, and inquisitive employee attitudes.
  - M.2 WIPP site functions, assignments, responsibilities, and reporting relationships of individuals and organizations are clearly defined, understood, and effectively implemented by line management responsible for control of safety so that there is no ambiguity, duplication or avoidance of responsibility.
  - M.3 The DOE-WPSO has the capability to oversee management, safety, and environmental protection activities of contractor operations.
  - M.4 The DOE-AL has the capability to adequately support the DOE-WPSO in its responsibilities to oversee health, safety, and environmental protection.
  - M.5 A clearly defined, traceable and functioning organizational chain of command exists from the responsible DOE headquarters program organization to the appropriate field organizations (AL, WPSO, WID, and others) to ensure that the involved individuals and organizations know and discharge their responsibilities for health, safety, and environmental protection.
  - M.6 Adequate oversight and DOE internal oversight of WIPP program activities is provided.
- **Functional Areas and Program Readiness**
  - F.1 There are established organizations that are adequately staffed and trained and with appropriate organizational structure, procedures and equipment to support facility operations.
  - F.2 The TRU waste packaging and transportation equipment and programs for the Dry Bin Scale Test Program will provide assurance that properly categorized TRU waste will be loaded, packaged, transported and unloaded at the WIPP facility in compliance with health, safety, and environmental requirements.
  - F.3 There are adequate support programs with appropriate requirements, procedures, and assigned staff to support safe facility operations and waste handling.
  - F.4 A program has been established to identify, evaluate, and resolve recommendations and findings made by oversight groups, official review teams, and audit organizations.

The criteria were based on the combined expertise of the Technical Experts and Senior Advisors, DOE Orders and other requirements, the potential hazards during the Test Phase of operations, the findings and advice of internal and external review groups, and the recognized program needs for

the WIPP facility. The criteria is listed in Appendices to the EM ORR main report.

The approaches identified the scope of the review and included plans for reviewing procedures and programs, inspecting equipment and facilities, auditing records, interviewing personnel, and observing operations during operational tests. Selected reviews were conducted on simulated operations by the contractor to test the response of operational and support personnel to normal and accident events.

To support the criteria and approaches, a basis was documented along with supporting references. An example objective, sub-objective with applicable criteria, approach, basis, and reference taken from page H-1 and H-2 of the EM ORR report appendices are listed below.

Objective H.1

"The structures, systems and components that are important to safe waste handling operations are properly identified, available, and sufficient and are consistent with the assumptions about such systems in the FSAR."

Sub-objective H.1.4

"Administrative controls are provided to assure that modifications to facilities and systems important to safe waste handling operations are analyzed, documented and approved."

Criteria

1. "Procedures and management directives require that all changes to waste handling facilities be properly analyzed, documented, and affirmed by appropriate personnel and organizations."
2. "Procedures and management directives for changes to waste handling facilities are properly executed."

Approach

1. "Review management directives and procedures to identify change procedures which establish that changes to waste handling facilities require analysis (of their own functionality, safety and possible interactions with other systems), documentation and review by appropriate Westinghouse/Sandia and DOE organizations prior to their implementation."
2. "Review at least two major changes to waste handling facilities to establish that these changes were properly analyzed (of their own functionality, safety and possible interactions with other systems), documented and reviewed, including, where necessary, reviews by independent organizations."

Basis

"Criteria are consistent with INPO Guidelines ensuing *adequacy* of design control and configuration control. Applicable DOE Orders were reviewed for additional guidance."

References

INPO 90-020 Performance Objectives and Criteria for Corporate Evaluations.

INPO 90-ABBE Guidelines for the Conduct of Design Engineering

INPO 90-015 Performance Objectives and Criteria for Operating and Near Term Operating License Plants.

INPO 86-009 Guidelines for the Organization and Administration of Nuclear Power Stations.

DOE 5481.lB Safety Analysis and Review System, May 19, 1987.

Findings

The ORR team identified 38 findings requiring resolution prior to initiating the Test Phase of operations (pre-start findings) and 61 findings that could be resolved after the start of operations (post-start findings).

The findings were categorized according to respective objectives categories; hardware (H), personnel (P), management (M), and functional (F). The distribution of these findings is shown in Fig. 1. The areas in which the findings were distributed are shown in Fig. 2.

WIPP REVIEW SUPPORT

All site entities, DOE-WPSO, SNL, and the Managing and Operating Contractor (WID) took part and supported the ORR. The support and involvement entailed technical support for the pre-assessment visit, the ORR, the ISC, logistical support for the ORR team, response development and line management review, resolution of priority (pre-start) findings and continual resolution of all other findings.

The site management support philosophy included the following elements: 1) where possible abate findings during the review, 2) provide expert technical contacts, 3) respect ORR technical experts viewpoints, 4) develop responses and action plans in coordination with the ORR technical experts during the review, 5) provide full logistics support for the team to ensure a thorough and expeditious review. These philosophies enabled closure and verification of pre-start findings and the ORR team's determination of "readiness" within four months from the initiation of the review.

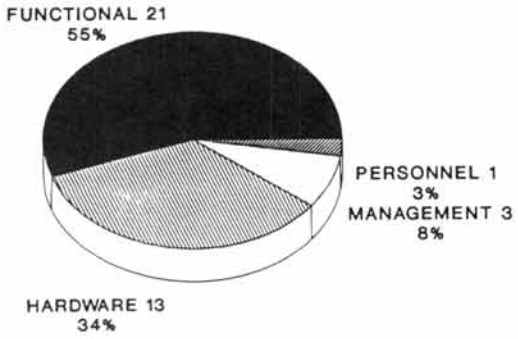
Pre-Assessment Visit

Without prior notification the WID pro-actively received and supported the pre-assessment visit in May 1991. Meetings with technical experts were arranged in the following areas: the WID internal ORR/ISC, the Dry Bin-Scale Test Program, documentation sources, environmental programs, conduct of operations and the status of the WIPP response to DNFSB Recommendation 90-2. These meetings were meant to familiarize the team with the technical and safety aspects of the facility. The visit enabled the team to initiate writing the implementation plan with scope and objectives, sub-objectives and the criteria and review approaches for each objective and sub-objective. The WID's intent was to initiate the review by demonstrating openness and a willingness to cooperate.

Logistical Support

The WID assisted the team with logistics beginning with the pre-assessment visit. This support included the following;

- Arranging centralized office space at the site
- Arranging computer equipment at the site
- Establishing a computer center at the team's motel
- Coordinating motel accommodations
- Coordinating rental car services
- Coordinating technical meetings and briefings during the review



POSTSTART FINDING CATEGORIES

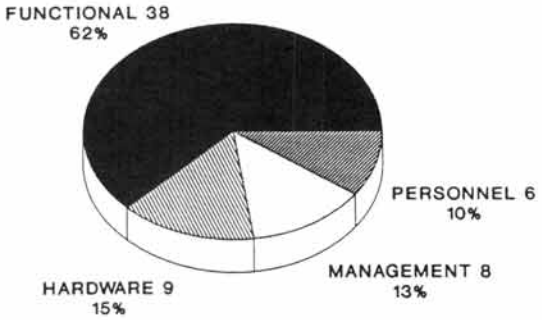


Fig. 1. Preststart finding categories.

- Established a primary site interface to assure successful coordination of all on-site technical support activities
- Established secondary interfaces to assist the primary interface

Finding Abatement, Tracking, and Resolution

When potential findings were observed, the WID made every effort to pro-actively abate the finding during the review. This abatement process minimized the formal response and resolution process.

Finding tracking and resolution was accomplished utilizing WP 15-057, External Oversight Agency Appraisal Tracking. This procedure outlines the mechanism used by the WID to review, assign responsibility, status, verify, and track external operational and safety reviews.

Finding response, verification, and tracking is coordinated by the WID Regulatory Assurance (RA) Section. Although this group is responsible for maintaining the procedure, responses are generated by line organizations responsible for completing the actions required to resolve the findings. Line organization ownership ensures timely and adequate finding resolution.

Draft action plans for pre-start findings, consisting of the response, actions required to resolve the finding and associated milestone dates, were developed by line organizations. Line organizations consulted with ORR team members while preparing action plans to ensure that all elements of the findings were addressed. An RA staff engineer processed and reviewed all action plans. This engineer functioned as the primary site liaison, was intimately involved in all stages of the review, and provided an independent technical review. Once finalized, the action plans were submitted to cognizant department managers for their review and signature. Once signed the action plans were then reviewed and signed off by the WID Deputy General Manager. This level of review ensured a high level of management attention for all pre-start findings. After completing the WID internal review, action plans were provided to the WPSO for review and concurrence.

Approved action plans were then delivered to the ORR team for review. Any comments or questions were addressed immediately in review meetings with the Team Leader, WID technical experts, WID line managers and the primary site interface. Approved action plans were tracked to completion by the RA staff engineer.

Upon completion the actions were verified complete by the RA staff. Verification entailed reviewing supporting closure documentation, field verification, and personnel interviews. Verification packages were then prepared and made available to ORR team members conducting field verifications. Any additional actions identified by the ORR verification team required to resolve the findings were completed immediately. This level of effort enabled closure and verification of pre-start findings and the ORR team's determination of "readiness" within four months from the initiation of the review.

With the exception of reviews, the post-start resolution process was similar. The WID senior management review was accomplished by a senior management review team rather than the WID Deputy General Manger. The WID review team was composed of the Department Managers from Quality Assurance; Engineering; Environmental, Safety and Health; and Operations. In addition the RA senior engineer/ORR team interface was involved in the review. Since the Team was no longer at the site, the DOE and Team reviews became more complex. Action plans for post-start findings were developed and submitted to the DOE as scheduled in the EM ORR Main Report Addendum Rev. 1. Six DOE organizations reviewed and commented on post-start action plans. Comments and findings were resolved. The closure status of post-start findings, as of January 12, 1993, is eighty-seven percent closed.

The primary lessons learned from this process are as follows:

- Establish a primary site interface to coordinate all on-site technical activities. This interface must take ownership of the coordination role.
- Provide internal review of action plans by an engineer independent of line organizations.
- Encourage open lines of communication between line managers and review ORR Team members to assure all aspects of the findings are being addressed.
- Encourage quick turnaround of action plans so that they can be reviewed and approved by team members before they leave the facility.
- Pro-actively abate and resolve findings.
- Establish site interfaces that review team members can call on for technical or logistical assistance and to coordinate interviews, tours, field reviews and verification activities.

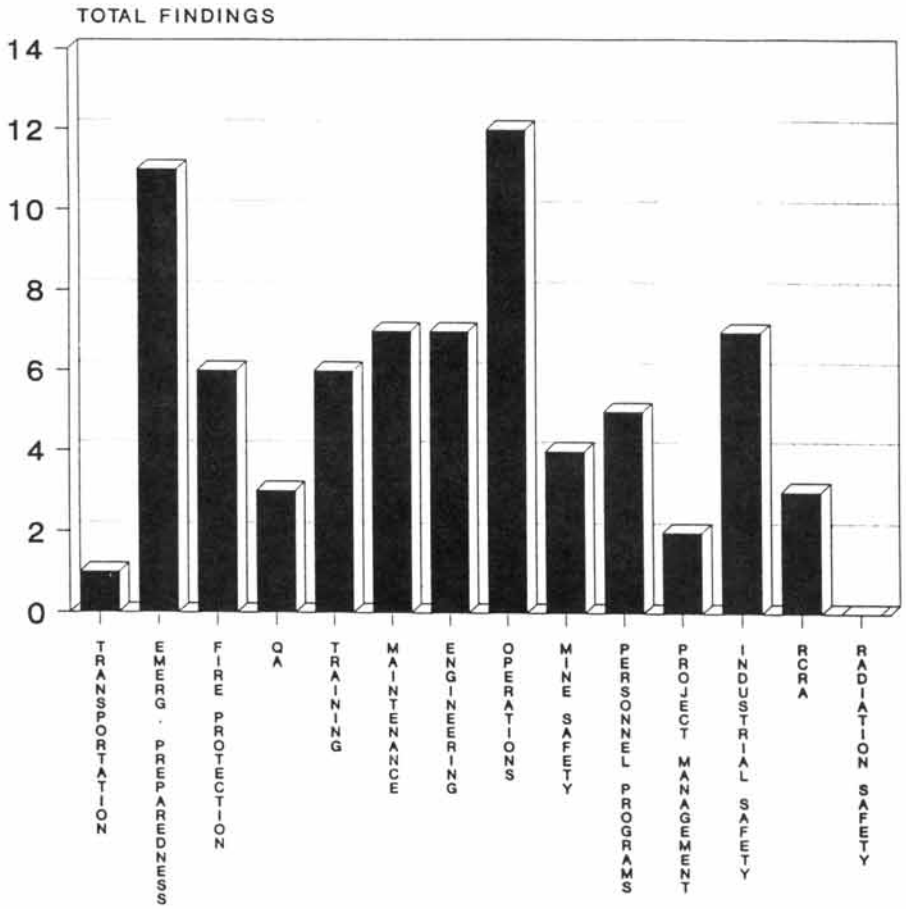


Fig. 2. WID pre and poststart finding areas.

- Have the primary site interface hand carry action plans through the review cycles to assure immediate attention.

CONCLUSION

The expeditious completion of the EM ORR and associated pre-start findings led to Secretary's proclamation of WIPP Readiness to Initiate the Dry Bin Scale Test Program within four months from the initiation of the review. The EM ORR process used for the review is considered exemplary and has been referenced in the recently issued, September 17, 1992, DOE-EM Guidance for Operational Readiness Reviews. The support provided to the EM team contributed substantially to a successful review.

ACKNOWLEDGEMENT

Work supported by the U.S. Department of Energy under DOE Contract No. DE-AC04-86AL31950 DOE/WIPP 92-046C

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