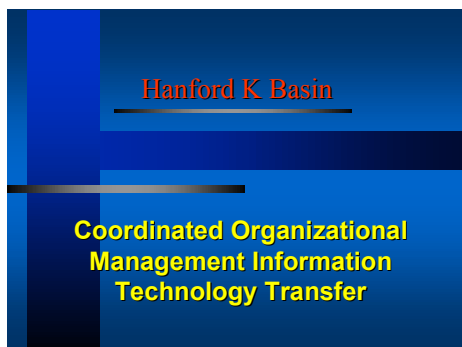


DOE Reports on Project COMITT

Prepared for presentation at the 1997 EFCOG Maintenance Workshop, June 16 – 19, 1997

Presented by: Mr. Tom Daniels, Director Waste Division, Richland Operations Office
Mr. John D. Long, Program Manager

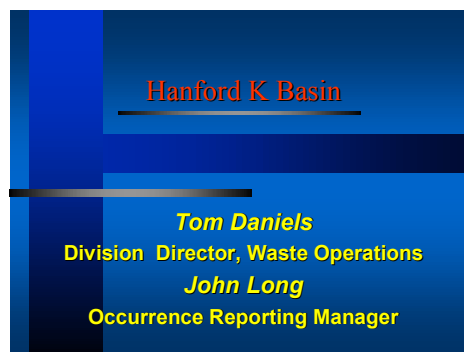
Slide One
Introduction



Project COMITT (Coordinated Organizational Management Information Technology Transfer) is an MIS development project being conducted by the Department of Energy, Richland Operations Office and DECISION systems, inc. in which REASON technology and software are being developed, integrated, and customized for use by the Richland Operations Office. This presentation explains the design criteria of the new Knowledge Management System, and how the Operations Office will use its capabilities to improve control Procedure Compliance and Safety Criteria Basis.

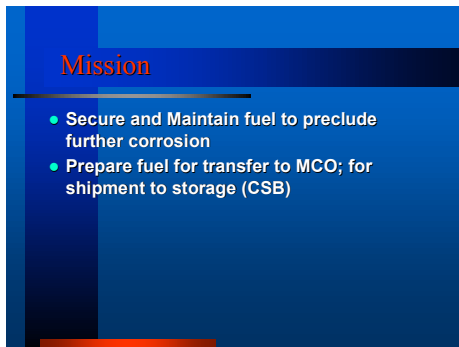
Slide Two
About the Presenters:

Mr. Daniels has been the Director, Waste Operations, at the Richland Operations Office for the last two years. He manages the development and implementation of the RL Facility Representative, Conduct of Operations, Operational Readiness Review, Readiness Assessment, Occurrence Reporting, Lessons Learned, and Performance Indicator Programs. Previously he was the Executive Director, Office of Self-Assessment, Defense Programs where as chairman of the DOE Lessons Learned Process Improvement Team, he was instrumental in the development of the DOE Lesson Learned Program. Prior to DOE, he spent 13 years with the U.S. Nuclear Regulatory Commission, and has 12 years of additional engineering experience in the Nuclear Navy. Mr. Daniels has an Associate Degree in Personnel Management, a Bachelor Degree in Engineering Management, and is Masters Candidate in Energy Economics.



Mr. John D. Long is a Program Manager for the Richland Operations Office. He is responsible for the operation of the Occurrence Notification Center at Hanford. Previously, he was Facility Representative for the 200 Area Tank Farms at Hanford. Prior to coming to Hanford, Mr. Long served as consultant for restart of K Reactor at Savannah River Site and development of the startup procedures for the Defense Waste Processing Facility at Savannah River Site. His experience prior to government service included startup engineering of seven nuclear power stations in the U.S. and Spain. Additionally, he has seven years of experience as a reactor operator on a fleet ballistic missile submarine. He has a Bachelor of Science Degree in Electronics Management and has completed post-graduate courses in Waste Management.

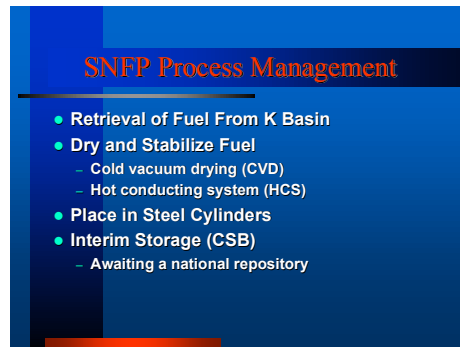
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SNFP Mission



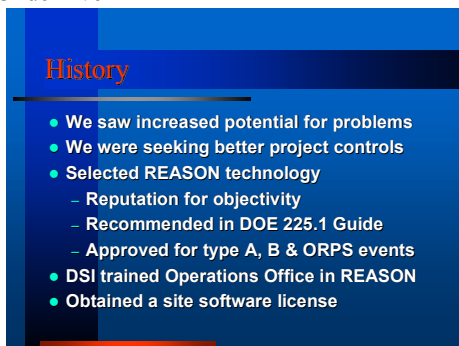
The K Basins at Hanford, Washington have two missions within the overall mission of the Spent Nuclear Fuel Project (SNFP). The missions are to (1) Maintain safety of the fuel and maintain the fuel to preclude further corrosion; and (2) Prepare the fuel and the K Basins for transfer of the fuel into Multi-Canister Overpacks (MCOs) for shipment to other SNFP facilities

Slide Four
SNFP Process

Fuel safety includes criticality safety, security, and maintaining the water chemistry and depth. Corrosion control relies on low water temperature and chemistry control. Preparation for shipment includes installation of fuel cleaning equipment and the Fuel Retrieval System. The SNFP overall mission is to retrieve the fuel from the K Basins; dry and stabilize the fuel; and place it in safe interim storage several miles from the Columbia, until a national repository is ready to receive it. Retrieval entails placing the fuel into 15 foot by 2-foot steel cylinders called MCOs. Drying will be done in one or two facilities for cold drying under vacuum (CVD) and hot drying under partial vacuum (Hot Conditioning System, HCS). Safe interim storage will be in the Canister Storage Building (CSB), until the containerized fuel can be moved to a national repository at Yucca Mountain or WIPP at Carlsbad, New Mexico.



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- Viewing past experience at the site and compounding those existing challenges with the demands of the new project, we saw only increased potential for problems.
- It did not seem prudent to rely only upon our existing methods and tools to control the new project. We decided to see what could be developed to help establish, maintain, and measure better controls.
- For several years we had been watching the results of the data being produced with REASON methodology at nuclear locations, including our Albuquerque office, LANL and Pantex. Several years ago I brought Decision Systems, the developers of REASON, to

Germantown to train my DC staff, so that we could research the system. Now it seemed to be the right time to start making some improvements.

- **We noted that the REASON system was recommended in the recent DOE 225.1 Guide for investigation of type A and B occurrences, and that it had established a solid reputation for objectivity. It seemed to promise capabilities that would make a positive difference.**
- Our first formal step was to train our Richland Operations Office Staff in the REASON methodology.
- We obtained a Richland DOE site license for the computer software, and began to explore the ways that the logic and analyses could be applied to improve and measure controls. We were especially interested in capturing the knowledge learned from experience as a prevention strategy.

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Next we established a study to reassess the data we already had from K Basin ORPS reports. It was our hope that the fresh look at the cases would provide additional value and insight to how we could establish improved controls for the new project.

- We selected a group of ORPS reports dating from 1993 to 1996 as the study data, as well as a data control group for future study involving new data.
- The control group of cases would serve as a base to measure quality of analysis.
- It was our plan to establish a means to compare existing data against any new data coming from efforts to expand the value of the reports by applying the REASON methodology to the same body of data.
- Our plan was to determine our data needs, as compared to the data we had, and from that study determine the design criteria for a new computerized management information system that we will be setting in at Richland.
- Finally, our task included reviewing the K Basin reports to identify and categorize data deficiencies. From this information we hoped to be able to pinpoint where analyses could be improved in order to remedy these data deficiencies.

K Basin Case Study (ORPS Cases 1993-1996)

- **Purpose**
 - Establish Control Group of Cases
 - Measure Quality of Analyses
 - Provide Comparison of Data Quality
 - Determine Design Criteria for New Management Information System
 - Identify Data Deficiencies

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K Basin Case Study (ORPS Cases 1993-1996)

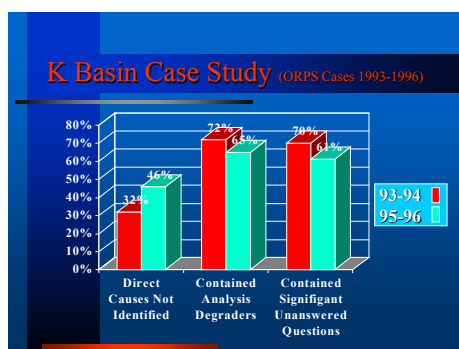
- **Findings**
 - No Criteria for Validating Analysis
 - Inconsistent Data
 - Critical Factors not Investigated
 - Critical Questions not Answered
 - Root Causes Overlooked
 - Direct Causes Omitted

The K Basin study revealed several consistent deficiencies. We found that no contractor provided a criterion for validating the results of their analysis. It has been DOE's position in the past to allow latitude in the application of analysis methodology, and to specify only performance goals. However, without some criterion to establish the validity of the analysis, the consistency of quality and accuracy has suffered. This is a fundamental deficiency that is being remedied through this effort.

We found:

- Inconsistent data – some reports were detailed and on-target, others not.
- Critical factors were not investigated. For example, in one case a fire inspection report was lost and not available to the crew, but the reason went uninvestigated and unexplained.
- Critical questions were not asked – so potentially important information fell through the cracks. Questions like *why* required training was not provided.
- In some cases root causes were overlooked.
- In many cases essential direct causes were omitted

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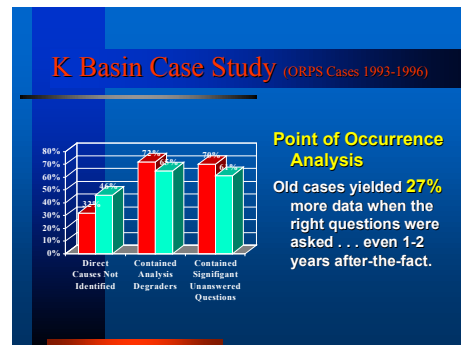


I would like you to look at the quality of analysis and data produced by **past methods and procedures: Change, Barrier, Events & Causal Factor Charting and MORT**. DOE and contractors have been working with inadequate information. We broke our K Basin reports into '93-'94 cases and '95/'96 cases. We figured, with all of the training and emphasis upon analysis, that this view would indicate some degree of improvement in occurrence analysis and reporting. What we discovered is that there was only marginal improvement . . . if any.

The '95/'96 cases had a high percentage of missing direct causes. That is, the causes that came together at the final point in time to produce the occurrence were not well identified. **Additionally, 65% of the cases in this group were flawed with degraders such as unsupported assumptions, conjecture, opinions, premises unsupported by the environment, etc.. And 61% contained significant issues that were not addressed . . . unanswered questions.** The earlier 93/'94 cases showed a better performance in identifying basic primary causes than did the later cases in '95/'96, but some improvement was noted in degraders and unanswered questions. Later analysts were less inclined to use assumptions and conjecture to bridge between facts.

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Most of us know the difficulty of trying to go back later after an occurrence to capture data for reports and analysis. This known obstacle makes the results of our review even more significant. DOE and Contractor personnel took the old ORPS reports and used the Point of Occurrence Analysis method to “reinvestigate” after-the-fact. **The group produced 27% more data when REASON logic focused them upon the correct questions to answer. More root causes and prevention opportunities were uncovered as well. For example, in one '96 case, operations personnel did not verify that locks were in place and locked. One of the reasons was that the personnel could not see the locks from outside the contamination area, because tumbleweed had blown into the fenced enclosure. It was a common problem at this location, and it remained there. No policy existed for the removal of tumbleweed. I choose this case to illustrate how Point of Occurrence Analysis drives the process to reveal every internal opportunity to prevent, even if someone using conventional methods might think that the root cause is not worth noting. We can only guess how much more accurate and complete the analyses on all of these cases would have been, if REASON, Point of Occurrence logic had guided the original investigations and analyses.**



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Yesterday Misinformation-Today Problems

New Advanced Management Information System

- Project COMITT Integrates:
 - Objective Root Cause Analysis
 - Lessons Learned
 - Risk Assessment
 - Management Oversight

We were comfortable with the quality of data coming through the REASON methodology. The software system automatically generated a structured analytical model and an ordered cause and effect narrative. Now we wanted to see what capabilities and benefits we could squeeze and massage from a database that was structured and ordered on a basis of causality. **For the first time we would have a database that recorded the causal systems. This information is an entire level higher than any data we have had in the past.** Instead of trying to analyze categories of causes, we will be able to analyze the actual causal systems. We knew the fundamental criteria upon

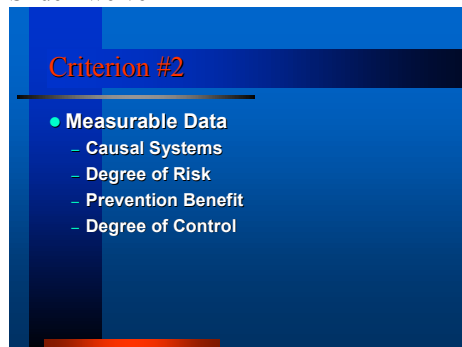
which we would build the new knowledge management system. **First, and most important, our data will be objectively gathered, ordered, analyzed, and reported. It will be complete, accurate, measurable, and verifiable.**

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The logic structured analytical model provides us an objective quantification standard for measuring the causal process. We determined that the information system would be solidly based upon only objective quantification. We reasoned that if we **strip away and exclude opinions, personal assessments, estimates and conjecture, we are left with structured, causal facts upon which decisions can be reliably based.** That means that we will have a system that can put hard numbers to causal systems, the risk represented by those systems, the degree of prevention benefit we can anticipate through the removal of those systems and thus the degree of control we have maintained in the environment.



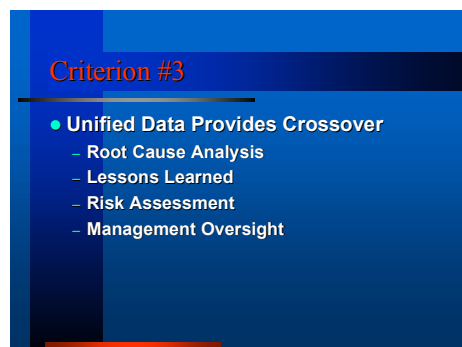
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This leads us to the biggest news, and the purpose of this presentation. **When we discovered that the REASON data provided direct crossover to application,** our office contracted with Decision Systems, Inc. in an alliance to produce a breakthrough knowledge system. I use the term “breakthrough” because it provides the capabilities that we have actively sought for decades. The unified, logic structured, causal data produced by REASON, make the data accessible by software for many computerized applications and purposes. Instead of objective root cause analysis being the end goal, it has become the first step in an integrated approach to our knowledge management system.

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Development of the new MIS program has been dubbed Project COMITT. That acronym stands for “Coordinated Organizational Management Information Technology Transfer.” **Its goal is to integrate root cause analysis, lessons learned, risk assessment and management oversight into one interactive system.** The implications to control of projects like the SNFP are profound.



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Project COMITT

How Richland DOE will use the system:

- Validate accuracy and completeness of contractor analysis. (ORPS & 225.1)
- Validate compliance to DOE 225.1
 - Cause/effect relationships
 - Judgement of need
 - Recommendations

I would like to tell you how our office will be using this advanced system. Let's start with the basic root cause analysis capability. The Point of Occurrence Analysis methodology is based upon logic rules. When the logic is applied to the facts, it is possible to validate quickly the accuracy and completeness of occurrence reports. Our office is currently using the system to check ORPS reports as well as analysis of type A and B occurrences.

The system provides those criteria for validation that I mentioned earlier were missing from the picture. The system makes it easy for the contractor to understand

what kind and form of information we need and want. As an example, I can tell you about a situation that occurred only days ago. Our office rejected an analysis report, and returned it to the contractor, requesting more complete causal information. The contractor returned it to our office unchanged and stated that the report was complete and accurate. In order to demonstrate what data we were requesting, our office used the computerized method to build an analytical model of the occurrence, exactly as it was depicted by the contractor's report. The model was a collection of unanswered questions that showed up in the model as chains ending in ID (for insufficient data). Along with the model went our note requesting the answers to the many ID's.

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The root cause analysis method leads us to identify the level in the organization at which the problem can be remedied: management, supervisor or individual. The database will enable us to determine the nature and extent of breakdowns in control. **For example,** a site producing a group of occurrences in which every opportunity to prevent recurrence requires a management level action, has less control of the environment than one where only individual exceptions to control are noted. **With this utility it will be possible for us to audit in real-time each contractor's effectiveness and improvement of organizational controls.**

Project COMITT

How Richland DOE will use the system:

- **Monitoring Organizational Control**
 - effectiveness of contractor Management Controls/Policies
 - effectiveness of contractor Procedural Controls/Methods
 - effectiveness of contractor Personnel/Compliance

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Project COMITT

How Richland DOE will use the system:

- Maintain site-specific Lessons Learned
 - Real-time view of causes
 - Real-time planning/action resource
 - Contractor oversight (causal systems)
 - Compare contractor responses
 - Remediation oversight

Years ago, I was among the first to recognize the need for a lessons learned system, and to voice that need. Most of you know that the Department now maintains a Lessons Learned system on the Internet. But the system is limited in its application. It is more a place to read about critical occurrences, than a source of practical day-to-day information that will help in our tasks. The lessons are by definition a record of the unusual and unexpected.

Let me tell you about the advanced concept of Lessons Learned and how we plan to use it.

Part of the computerized analysis process results in identifying and recording causes in sets within an analytical logic tree model. For example a set of causes might be “oxygen was present”, “fuel gas was present”, and “Paul lit a match.” In this case the set of causes records the one point in time that produced an explosion.

One major advantage to the new system is the ease of submitting data into the system. Our Lessons Learned system will not require someone to select, analyze, write and post each story on the Internet. Instead the lessons will go automatically into the system without the effort or time of personnel, because the lesson is the file already created by the root cause analysis software. Using the example of the explosion, we will be able to find cases that involved causal systems when fuel gas and oxygen and a lit match came together. More importantly from a prevention perspective, we will be able to find where fuel gas and oxygen combined, in order to discover what the ignition source was. I am sure that you can appreciate the value of such a system to both DOE and our contractors.

Our office will use the system routinely to keep abreast of the causal influences that are interacting at the site. Searching and identifying those interactions proactively for potential danger and opportunity to improve controls.

The Richland lessons learned system will be a DOE and contractor resource. **It will overcome the two major obstacles to conventional lessons learned approaches. Instead of searching for words, the system will search for causal systems.** That means only direct, more causally relevant information is found. Not a long list of cases that have certain words appearing in the report. Also the Richland system will automatically abstract the data into a brief narrative, so that reading time is cut to a minimum, until you find what you are looking for. The result is a “real-time” accessible lessons learned system that will serve to help both DOE and contractors maintain controls.

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One of the important improvements we anticipate from the new management information system is made possible by the objective quantification system that measures the causal process. To help you understand the many uses of this utility, **I would like you to think about what happens when we pinpoint a root cause, and act to remove it from our environment.** There is a feeling that we have made things right again, isn't there? But, when the Point of Occurrence analysis method is applied to the root cause analysis task, **we usually find multiple root causes, not one.** The system measures each root cause and the part it played in producing the occurrence. **Each root cause represents a lack of control . . . and each lack of control is an amount of risk in the operation.** With this perspective, we will be able to go beyond the conventional methods of risk assessment, which are based upon historical experience and numerical predictions. We will be able to pinpoint, measure, analyze, and “manage” the risk.

Project COMITT

How Richland DOE will use the system:

- Measure Control/Risk
 - Oversight of specific environments
 - Identification of high risk for targeting
 - Managing Risk/Controls

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Finally Project COMITT will provide our office with new ways to monitor, assess, analyze and fine-tune control. We will be able to provide contractors with new opportunities for improving their operations. The goals of the Department of Energy are established and serve as our measure for success. If DOE achieves its goals, we all have done our jobs well. Contractors devise strategies to accomplish the appropriate goals of the Department. With these strategies determined, policies are written to accomplish the strategies. Then procedures are developed to achieve compliance with the policies. The goals, strategies, policies and procedures form an interactive and interlinked system. When a counter-quality occurrence or condition exists, the dynamics produced are counter to the goals of the Department. These are the two concepts that form the management oversight system.

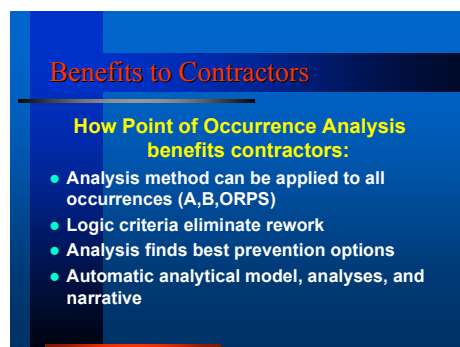
It works like this. When a problem occurs, and the occurrence is investigated, analyzed and reported, it is linked to the policy area that it most directly impacts. With that link recorded, we then know the procedures, strategies and goals involved. Now lets see what kinds of capabilities this system offers.

For instance, we might ask the system, “what DOE goals are being the most negatively impacted by occurrences in K Basin”. We might see that procedures and policies are being observed, but that we are no nearer our goals. What would that tell us? It would say that the strategies developed by the contractor are not on-target. Similarly, if procedures are being observed, but basic policies are not achieving the contractor’s strategy, we know that the policy is not adequate. **With the real-time ability to monitor the effect of contractor strategies, policies and procedures upon the goals of DOE, we will have a tool that will enable us to make early course corrections, so that we and the contractors can avoid those last minute crisis corrections, or worse . . . after-the-fact corrections.**

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The REASON system has many direct benefits for the contractor as well.

- The Point of Occurrence methodology can be applied to all types of occurrences. That means the reliability, quality of data, and efficiencies are available on all cases.
- With logic criteria to validate analyses, the contractor can be confident of accuracy and completeness before submitting a report. This will dramatically reduce rework and wordsmithing of reports.
- With the ability to automatically generate and instantly edit analytical models, in many cases, hours will be saved on reporting. Instant analyses and automatic cause and effect narratives can be transferred in seconds to reports, saving endless hours of deliberation, writing and reworking.
- Cap these with the real-time assistance that we will be able to provide contractors by virtue of our advanced knowledge management system.



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In Summary

- **We accomplished our goals . . . better methods and tools to meet the new challenge.**
 - Improvements in quality of analysis and data from occurrence reporting.
 - Improved planning and control capabilities
 - Integrated solution for root cause analysis, lessons learned, risk assessment and management oversight

In summary, when we faced the challenge of new and increased responsibilities, we set out to find better methods and tools to meet the challenge. Our K Basin study showed us where important improvements could be made in the quality of analysis and data from occurrence reporting. We took that visibility and set about to design an information system that would provide improved planning and control capabilities. Over the coming months we will be setting in a computerized system that will provide an integrated solution for root cause analysis, lessons learned, risk assessment and management oversight. With the new data, both DOE and our contractors will have a new tool at our disposal, a tool that can be applied

to maintain and improve the quality and reliability of our operations.

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