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The attached SFC document is being forwarded to you for inclusion into DCS. Per Michael Vasquez, Project Manager for SFC at RIV, nothing in this submittal should be withheld. He said if you have any questions to please call him. He can be reached at 8-817-860-8121.

Thank You,

Carol Dube

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Office: _____ Accession #: _____ Docket #: 40-8027

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DOCUMENT TITLE: _____

Phased Startup of Sequoyah Facility

NOTE TO: _____

Jodi TALBERT, RGN-IV

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5/18/92

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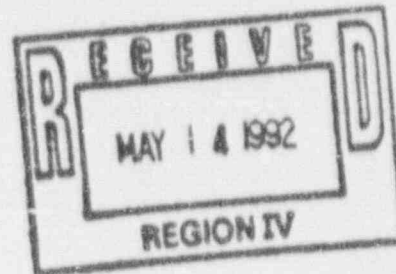
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"CONTINUED ON REVERSE SIDE"



May 13, 1992

Certified Mail
Return Receipt Requested



Mr. Robert D. Martin
Regional Administrator
U.S. NUCLEAR REGULATORY COMMISSION
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Off: 40-8027
Ex: SUB-1010

REFERENCE: Letter from James J. Sheppard to Robert D. Martin,
dated May 8, 1992

RE: Phased Startup of Sequoyah Facility

Dear Mr. Martin:

By our letter dated May 8, 1992, Sequoyah Fuels Corporation (SFC) committed to complete a detailed root cause analysis of the UF₆ leak which occurred on May 1, 1992 and to address any corrective actions deemed necessary prior to restart of the DUF₄ plant or continuation of the restart of the UF₆ plant beyond the current hold point. SFC has completed the root cause analysis and developed an action plan for implementing corrective actions. The root cause analysis is included as Attachment 1, and the action plan is included as Attachment 2 to this letter. A table correlating the corrective actions from the action plan to the corrective actions recommended in the root cause analysis is included as Attachment 3.

The action plan identifies three groups of actions:

- Generic Short-Term Actions
- DUF₄-Specific Short-Term Actions
- Long-Term Actions

In Attachment 3, the corrective actions in category "A" are the generic short-term actions. Category "B" actions items are the DUF₄-specific short-term actions and category "C" items are the long-term actions.

SFC has evaluated the long-term actions and determined that they are not required to be completed prior to continuing the phased restart of the Sequoyah Facility. In general, the long-term actions include tasks to develop permanent policies,

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Mr. Robert D. Martin
May 13, 1992
Page Two

programs and revised procedures as well as actions to review and revise, as necessary, the design of some DUF₄ facility systems. Interim, short-term measures, such as issuance of temporary operating procedures, are being taken to assure appropriate controls are in place prior to completion of formal policy, program and procedure upgrades. Specific justification for each deferred action is included with the action plan in Attachment 2.

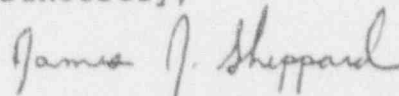
The root cause analysis and corrective action plan have been reviewed and approved by the Plant Operations Review Committee (PORC). The PORC has recommended that SFC proceed with the restart of the DUF₄ facility and the phased startup of the UF₆ facility to the third hold point contingent upon implementation of the action plan short-term actions.

Pursuant to our letter of May 8, 1992, SFC requests NRC concurrence with the corrective action plan outlined in Attachments 1 and 2 respectively, and to restart the DUF₄ plant and continue with the phased startup of the UF₆ plant, contingent upon completion of the short term actions, and completion of operational performance reviews in accordance with the phased startup plan. SFC will keep the onsite NRC inspectors informed of the corrective action implementation status to assist in verification that the actions have been completed.

SFC is presently performing a review of the past operation of the facility under the phased startup plan and a review of the readiness for restart of the reduction and hydrofluorination portions of the UF₆ plant. The results of those evaluations will be provided to the NRC by a separate letter.

Please contact me if we can provide any additional information regarding this subject.

Sincerely,



James J. Sheppard
President

JJS:nv

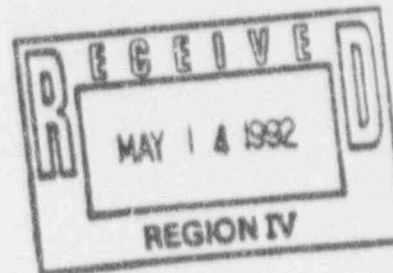
xc: Robert M. Bernero, NRC-NMSS
John W. N. Hickey, NRC-NMSS
Diane Curran, Esq.
James G. Wilcoxon, Esq.
Brita Haughland-Cantrell, Esq.



May 13, 1992

*Similarity to Jan 10
incident - non routine
Maintenance
(9204 at p.)*

Certified Mail
Return Receipt Requested



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Mr. Robert D. Martin
May 13, 1992
Page Two

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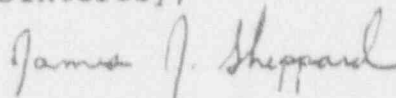
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Sincerely,



James J. Sheppard
President

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John W. N. Hickey, NRC-NMSS
Diane Curran, Esq.
James G. Wilcoxon, Esq.
Brita Haughland-Cantrell, Esq.

SEQUOYAH FUELS CORPORATION
ROOT CAUSE ANALYSIS

PROBLEM: DUF. RELEASE, 05/01/92

PREPARER:

J. E. Bohannon

DATE

5/11/92

MANAGER, QA:

M. J. Dunlap

DATE

5-12-92

9208030023

ROOT CAUSE ANALYSIS - DUF₆ RELEASE, 05/01/92

REVIEWED AND APPROVED BY:

PORC

Manager, Engineering & Maintenance

C. J. Monnich to LJS

DATE

5/8/92

Manager, Laboratory

Don R. Ph

DATE

5/8/92

Manager, Operations

Richard V. Vinton

DATE

5/8/92

Manager, Health & Safety

Scott C. Munro

DATE

5/8/92

Manager, Environmental

Tom Blach

DATE

5/8/92

Manager, Waste Management

P. Philip Frost

DATE

5-8-92

PORC Chairman/
Manager, Procedures
& Training

Lawrence Martin

DATE

5-8-92

Senior Vice President

John H. Ellis

DATE

5/8/92

AREA MANAGERS:

UF₆ Area Manager

W. A. Thompson

DATE

5/8/92

UO₂ Area Manager

William L. K. K...

DATE

5-8-92

DUF₆ Area Manager

Steve C. Lambson

DATE

5/8/92

CONFIDENTIAL INFORMATION - SEQUOYAH FUELS CORPORATION

1. Event Synopsis

Since restart of the DUF₄ Plant on April 16, the UF₆ feed system for AU-5820 had not been operable due to a flow restriction somewhere in the system. Plans were developed to locate and correct the problem and were presented in planning meetings on April 24 and 29.

On Wednesday, April 29, a cylinder of UF₆ had been partially fed from the east autoclave, AU-5821, and was taken off line around 12:30 in the afternoon due to some operating problems. The cylinder was known to contain residual UF₆ that would require further processing at a later time, so the cylinder valve was left open. The decision was made to prepare for the maintenance work to locate the pluggage in the UF₆ feed system for AU-5820. The UF₆ feed lines were purged one at a time with nitrogen from the UF₆ feed valve through the surge tank. This process was completed about 10:30 p.m. At about 11:45 that evening, a circuit breaker which provides power for a short section of heat tracing (henceforth this will be referred to as the "short heat tape") between each autoclave and its UF₆ feed valve was placed in the open position. The heat tracing for the UF₆ feed lines from the feed valves to the surge tank was also de-powered. The hot boxes around the UF₆ surge tank and the reactor feed line were also de-powered.

On April 30, preparations for the maintenance job continued. This activity included writing HWPs and Work Orders. Maintenance erected a tent around the head of AU-5820 in case the maintenance work required removing valves in that vicinity. Other routine activities continued (transferring an HF rundown tank, loading a Ligon truck).

On Friday, May 1, Maintenance located the pluggage in a spool piece between valve PV-5085A and a manual valve. To ensure that the problem had been corrected, all heat tapes and hot boxes were turned back on at 1308. A nitrogen purge was initiated at 1347 from downstream of the UF₆ feed valve, XV-5175, and through the UF₆ surge tank and the reactor. The flow rate achieved was normal, indicating that the restriction had been corrected. The heat tapes were de-powered about 1415 in preparation for a weekend shutdown. The DUF₄ Supervisor was on the upper levels about that time checking to ensure everything was in a correct shutdown status. As he came down the steps and reached the second level, he saw a cloud of UF₆ around the autoclave area. He called the Control Room and reported the situation. An Alert was called about 1420. After investigating, it was found that an overpressure situation had caused a leak of UF₆ at a flange gasket on a plug valve below the nitrogen bump tank for AU-5821. The Alert was downgraded to an Unusual Event at 1645 and then the event was terminated at 1808.

2. Root Cause of Event

The root cause of this event was the failure of the DUF, operating staff to recognize the potential problems created by a non-routine condition. The non-routine condition was de-energizing a breaker for the short section of heat tracing from the autoclave (AU-5821) head to the UF₆ feed valve, XV-5176. This condition in conjunction with an open cylinder valve on a warm UF₆ cylinder allowed the buildup of UF₆ in the short section of process line immediately downstream of the autoclave fixed head, a result unrecognized by the operating staff.

Recommended Corrective Actions:

A number of the corrective actions listed for the causal factors relate to the root cause. All recommended corrective actions are listed in Section 6 below. Taken as a whole, the corrective actions would prevent recurrence of this event and others that might be created by similar situations.

3. Causal Factors for Event

A. Communications during planning for maintenance were incomplete

Generic Issue for Sequoyah Fuels

Incomplete communications during planning for the maintenance work resulted in an improper decision to turn off all heat tapes in the facility, with one exception. In preparation for the maintenance activity, the DUF, Supervisor left the heat tape on for the tubing leading to a pressure transmitter for the UF₆ Surge Tank, because she wanted to ensure that UF₆ would not solidify in the cold tubing, causing inaccurate pressure reading for the surge tank. She failed to recognize that the same situation had been created in the piping section just downstream of AU-5821 by turning off the heat tape there.

Planning meetings were held on April 24 and 29 for the maintenance activities needed to locate and correct a pluggage on the AU-5820 side of the UF₆ feed system. The written plans for maintenance preparations (April 29 meeting) indicated that the UF₆ hot box and surge tank were to be cooled on Wednesday, April 29. However, nothing was mentioned about cooling the UF₆ feed line. (Note that there are two independent sections of heat tape for the UF₆ feed line, one downstream and one upstream of the feed valve.) Later discussion with the process engineer who was involved in planning the maintenance work indicated that he intended the entire system to be cool on the AU-5820 side in preparation for the maintenance. However, he was unaware that in order to cool the short section of line from the autoclave to the UF₆ feed valve, XV-5175, the heat

tracing in the corresponding location on the AU-5821 side would also be turned off, since both heat tapes are on a common breaker. The DUF, supervisors, who knew that the short heat tapes are on a common breaker, and knowing that the line on the AU-5820 side needed to be cool in preparation for the maintenance, went ahead and opened the breaker that cooled off both short heat tapes.

The Area Manager was not involved in the planning meetings for this particular maintenance activity. His involvement in planning efforts for maintenance activities normally includes only the review of meeting minutes. The process engineer assigned to DUF, and the DUF, Supervisors normally plan maintenance activities. The involvement of the Area Manager in the Manager on Shift program did not affect his participation in the planning efforts.

Recommended Corrective Actions:

- (1) In preparation for non-routine activities, planning meetings should be held in which issues are thoroughly discussed and documented. The planning phase for such activities should include some form of **systematic safety analysis**. The key is to develop a more formalized process for safety review. In this particular case, attempts were made to determine the safety hazards of the job. However, the focus was on the safety hazards that could be associated directly with trying to locate the pluggage in the line on the AU-5820 feed system. It appears that any possible effects on the AU-5821 side were largely ignored. To avoid such a narrow focus, a systematic and thorough approach is needed in safety analyses, since peripheral issues may often be the true safety hazards, as in this case.
- (2) Criteria should be developed for the type of non-routine activity that would require a formalized safety analysis.
- (3) In addition, the organizational level at which such reviews would occur must be determined, and this may vary depending on the particular activity being analyzed.
- (4) Supervisors should be trained in the principles of process hazards analysis to develop a thought process that emphasizes identification of hazards even when a formal review is not required.

B. DUF, Operations Staff Went Beyond Scope of Planning Meetings and Turned Off All Heat Tapes

Generic Issue for Sequoyah Fuels

The DUF, Supervisor said that it was necessary to turn off the heat tape for the west autoclave (AU-5820) in order to have the piping

and valves cold in anticipation of possible maintenance work in this area. This had been discussed in the planning meetings. In addition, he stated that having the other side cold would eliminate the potential for a pressurized system that could make its way through any valves that might be leaking between the east autoclave and UF₆ surge tank, where the first phase of maintenance would be performed. Since some others were not aware that the short section of heat tape on AU-5821 was on a common breaker with AU-5820, turning off the heat tape on both autoclaves was perhaps not intended by those planning the preparations for the maintenance work. It appears to have been a decision made solely by the supervisor(s).

Recommended Corrective Action:

As discussed below under Item 3.C, a procedure should be developed and approved for non-routine activities after planning and safety analysis are complete. As with all procedures, strict compliance with the procedure would be required.

C. DUF₆ Operations Staff Violated N-800-15

*If CTS and someone
the procedure was
can be used*

Generic Issue for Sequoyah Fuels

Procedure N-800-15 (Short-Term Shutdown) requires that heat tapes be left on for short term shutdowns, with the setpoints reduced somewhat below the normal operating temperature. The shutdown for maintenance appears to meet the definition of "short term shutdown" given in the procedure. Therefore, by shutting off the heat tapes, N-800-15 was violated. No TOP had been prepared to allow this action.

Note that N-800-15 was again violated on Friday, May 1 shortly before the event. The heat tapes were shut off in preparation for the weekend, with the following rationale: Since maintenance was just completed and no one would be attending the plant over the weekend, it would be safer to shut off the heat tapes to avoid any possible pressurization that could result in a leak. Although the intent was to enhance the safety status of the plant while unattended, the procedure was in fact violated. In such cases where a safety enhancement is desired for a non-routine situation, a TOP must be prepared.

Recommended Corrective Actions:

- (1) Procedural compliance is mandatory at all times. When non-routine activities would require deviation from a procedure, such as N-800-15, a TOP must be obtained. Further, certain non-routine situations (criteria to be developed) should receive a safety analysis, as discussed under 3.A. In more complex cases, a new procedure (perhaps temporary in nature,

but with more rigid review than normal TOPs) should be developed and approved by PORC before the activity is undertaken. In these situations, some alternate approval means besides PORC should be specified in cases in which PORC will not be available within the time-frame in which the procedure is needed.

- (2) Procedure G-002 (Temporary Operating Procedure) should more clearly indicate when a TOP is required. The present revision seems to leave preparation of a TOP optional in many cases, which is not the intent.
- (3) The need for procedural compliance at all times needs to be re-emphasized. The requirement for procedural compliance especially needs to be stated in the case of non-routine activities. which seems to be an area of confusion.

D. N-800 Procedures Do Not Refer to the Short Section of Heat Tape

None of the N-800 procedures refer to the short section of heat tape that was turned off and which by being off allowed the buildup of solid UF₆ in the piping. N-800-15 (Short-Term Shutdown) by implication would seem to say that heat tracing should be left on for short term shutdowns (i.e. since the other heat tapes are to remain on at a reduced temperature setpoint). An unusual design feature is the common breaker for the short sections of heat tape for both autoclaves. This situation contributed to the heat tape on AU-5821 being turned off, since it was not a commonly known feature.

This lack of direction concerning an important equipment item with a safety function very likely contributed to the event.

Recommended Corrective Action:

- (1) Revise N-800 procedures to include the proper operation of the short heat tapes between the fixed head of the autoclaves and the UF₆ feed valves.
- (2) The meaning of "full procedural compliance" needs to be clarified. In cases in which the procedure does not address a particular area (e.g. an activity that may be encountered infrequently), these omissions must be identified and handled through preparation of a TOP, procedure revision, or new procedure.

*I thought this was understood.
Apparently if a procedure is silent on an issue, they can decide on their own.*

E. Cylinder Valve Left Open Due to Difficulties Created by Interlock Scheme

After the cylinder in AU-5821 was partially fed out, the steam supply was shut off in preparation for the maintenance work to locate pluggage in the AU-5820 feed system. The cylinder valve was left open so that later the remaining contents of the cylinder could be fed to the reactor. If the cylinder valve had been closed, it would have created a difficulty in resuming the processing of the cylinder, since the autoclave would have had to be opened and a pigtail test performed again, based on the existing interlock scheme. Because the cylinder would still be warm after the weekend, the remaining pressure would prevent passing the pigtail test, which requires the cylinder to draw the pigtail down to a vacuum. Ultimately, this would result in not being able to open the UF₆ feed valve unless an interlock bypass was performed. Such bypasses are not possible on midnight shift (when the restart would normally occur after a weekend shutdown), because it requires someone to modify a parameter in the Bailey Control System, an action strictly limited to two individuals.

It should be noted that cylinder valves are routinely left open for short-term shutdowns (including weekend shutdowns), and this is allowed by N-800-15. The purpose for this action is for the very reason stated above (i.e. the interlock scheme would otherwise cause a difficulty upon attempting to resume operations). As this event demonstrated, only one other condition (heat tape off) besides an open cylinder valve on a warm UF₆ cylinder is needed to cause pluggage of UF₆ in the piping with potential leakage resulting when the piping is reheated.

Recommended Corrective Action:

- (1) Review the applicable N-800 procedures (N-800-15 and possibly N-800-2) to assess safety implications in the event that heat tracing is inadvertently de-energized. Determine whether it is acceptable to leave cylinder valves open for short-term shutdowns. This review and any proposed corrective actions should be documented.
- (2) Review the interlock scheme which seems to lead to the need to leave cylinder valves open during short-term shutdowns. Determine whether any changes to the interlock scheme are advised to enhance ease of operability and safety. This review and any proposed corrective actions should be documented.

F. Design Does Not Appear to Address Combination of Conditions: Hot Cylinder and Heat Tape Off

No interlock exists that would prevent this combination of conditions. The mechanical system obviously did not provide adequate protection for such a scenario, and the scenario may not have even been contemplated.

Recommended Corrective Action:

Review the need for an interlock to address the situation of an open cylinder valve and a de-energized short heat tape. This review and any proposed corrective actions should be documented.

G. Common Breaker for Two Heat Tapes

The common breaker used for short heat tapes between both autoclave fixed heads and the UF₆ feed valve is an unusual design, which had more significance than realized. Apparently this situation was not widely known. At least one of the supervisors knew about the common breaker, but this was not discussed in the maintenance planning meetings, as mentioned in 3.A.

Recommended Corrective Actions:

Review the possibility of providing a separate breaker for each short heat tape, so that they are completely independent. This review and any proposed corrective actions should be documented.

H. OIU Operator Failed to Recognize the Significance of the High Pressure Alarm

Generic Issue for SFC

The Operator Interface Unit (OIU) Operator incorrectly attributed the high pressure alarm that was received on the OIU at 1351 on May 1 (approximately 30 minutes before the event) to activities associated with the maintenance work that had been underway. He thought perhaps a valve had leaked by and allowed some nitrogen pressure to build in this space. It is unclear if he and the supervisor communicated on this matter, or the OIU Operator proceeded based simply on his own logic. He also received a "bad quality" alarm about ten minutes later, which he acknowledged according to the printed record from the computer. He could not recall that alarm or acknowledging it.

After the event started, the OIU Operator noted that the pigtail pressure transmitter, PT-5276, on AU-5821 was in "bad quality". He was looking for a high pressure that could be the source of the leak, so he called that data up on the screen and monitored the pressure for a while. He noted that it did not decline, so he

assumed this must not be the source of the leak.

Recommended Corrective Actions:

- (1) The OIU Operator should be counseled to verify his conclusions prior to acknowledging alarms.
- (2) All Control Room Operators should be trained on proper response for non-routine situations.

I. No Formal Alarm Response Procedure Exists

Generic Issue for SFC

There is little procedural guidance on the proper response for a Control Room Operator to take when he/she receives an alarm. During normal operations, standard responses could be determined. For non-routine situations such as this one, standard responses would be more difficult, since it would be nearly impossible to determine in advance every possible situation.

In addition the methodology for responding to alarms has not been formalized. An alarm response procedure would give the Control Room Operator guidance on the proper methodology for responding to an alarm (i.e. the mechanics of acknowledging alarms - communications with the field, verifying conclusions, logging actions taken, etc.).

Recommended Corrective Actions:

Review the need for procedural guidance on response to alarms. This review and any resulting corrective actions should be documented.

J. Potential Installation Problem with Flange Gasket

A factor that may have contributed to the leakage of UF₆ at this particular gasket is that the flanges between which the nitrogen valve is installed do not appear to be parallel. The piping below the nitrogen bump tank is free to move. However, the other flange attached to the UF₆ line piping is rigid and appears to be cocked somewhat off vertical. This indicates that unequal tension would be required on the bolts in order to draw the flanges up parallel.

The failed gasket itself appears upon detailed inspection to have had an adequate sealing surface all the way around. It is difficult to determine whether it was equally compressed all the way around. The gasket was obviously elongated by the force of the escaping UF₆.

Recommended Corrective Actions:

- (1) Review whether a standard maintenance procedure for preparing gasketed flanges should be developed or should the training and job skills required of a mechanic be considered sufficient. The review and any proposed corrective actions should be documented.
- (2) Determine whether other gaskets in the piping system related to the event of May 1 were affected by the overpressure situation. Replace as needed and document findings.

4. Related Issues

Some other issues emerged during the course of this root cause analysis that are not really considered causal factors for this event. However, these issues are important and need to be considered.

A. No Breaker Tagging/Logging Procedure Exists

Generic Issue for Sequoyah Fuels

During this event, a number of breakers were opened for heat tapes, including the short heat tapes on the common breaker, one of which allowed the buildup of UF₆ by being off. Reportedly, none of these breakers were tagged when the breaker position was changed. This indicates a lack of formality in the process of changing a breaker position, which could result in the creation of situations which are not properly analyzed, such as this event. Inappropriate opening and closing of breakers could create a hazardous situation.

The one procedure which addresses tagging breakers, G-302 (Electrical Work Permit and Lock-Out) only provides for obtaining a permit and tagging breakers in limited situations (i.e. for maintenance activity, especially when breakers are to be locked for protection).

Recommended Corrective Action:

A procedure is needed that would require some type of logging and possibly review anytime a breaker position is changed.

B. The HWPs Used for the Maintenance Work Referenced EWPs That Were Not Used

Generic Issue for Sequoyah Fuels

Hazardous Work Permits for the maintenance work that occurred prior to the event referenced EWPs which were not actually used.

Recommended Corrective Action:

If an HWP references an EWP, it should be used for the job, or an entry made on the HWP form to indicate that the EWP was not used and why it was not used.

5. Event and Causal Factor Chart

The key events and causal factors associated with the release of DUF₆ on Friday, May 1 are shown in the attached Event and Causal Factor Chart. Two conditions which occurred in conjunction with one another provided the necessary ingredients that allowed the UF₆ release event to occur. These conditions were: (1) Leaving a cylinder which had been hot for normal operations connected via an open cylinder valve to the process lines; (2) Turning off a short section of heat tape which normally provides heat input for the section of piping between the autoclave head and the UF₆ feed valve.

6. Corrective Actions Underway or Planned

All reviews and proposed corrective actions that are developed in response to these issues should be documented.

6.1 Generic Issues for Sequoyah Fuels:

- 6.1.1 Develop a methodology for formalized systematic safety analyses in preparation for non-routine activities, thoroughly discussed and documented.
- 6.1.2 Develop criteria for the type of non-routine activities that would require a formalized safety analysis.
- 6.1.3 Determine the organizational level at which formal safety analyses would occur as appropriate for the particular type of event.
- 6.1.4 Train supervisors in the principles of process hazards analysis to develop a thought process that emphasizes identification of hazards even when a formal review is not required.
- 6.1.5 Develop approved procedures for non-routine activities after planning and safety analysis are complete.
- 6.1.6 Consider developing a new type of Temporary Operating Procedure that would require a more rigid review than normal TOPs in complex situations.
- 6.1.7 Revise G-002 (Temporary Operating Procedure) to

more clearly indicate when a TOP is required. The present revision seems to leave preparation of a TOP optional in many cases, which is not the intent.

- 6.1.8 Re-emphasize the need for procedural compliance at all times. The requirement for procedural compliance especially needs to be stated in the case of non-routine activities.
- 6.1.9 The meaning of "full procedural compliance" needs to be clarified. In cases in which the procedure does not address a particular area (e.g. an activity that may be encountered infrequently), these omissions must be identified and handled through preparation of a TOP, procedure revision, or new procedure.
- 6.1.10 Review the need for procedural guidance on response to alarms. This review and any resulting corrective actions should be documented.
- 6.1.11 Review whether a standard maintenance procedure for preparing gasketed flanges should be developed or should the training and job skills required of a mechanic be considered sufficient. The review and any proposed corrective actions should be documented.
- 6.1.12 All Control Room Operators should be trained on proper response for non-routine situations.

6.2 Issues Pertinent Only to the Depleted UF₆ Plant:

- 6.2.1 Revise N-800 procedures to include the proper operation of the short heat tapes between the fixed head of the autoclaves and the UF₆ feed valves.
- 6.2.2 Review the applicable N-800 procedures (N-800-15 and possibly N-800-2) to assess safety implications in the event that heat tracing is inadvertently de-energized. Determine whether it is acceptable to leave cylinder valves open for short-term shutdowns. This review and any proposed corrective actions should be documented.

- 6.2.3 Review the interlock scheme which seems to lead to the need to leave cylinder valves open during short-term shutdowns. Determine whether any changes to the interlock scheme are advised to enhance ease of operability and safety. This review and any proposed corrective actions should be documented.
- 6.2.4 Review the need for an interlock to address the situation of an open cylinder valve and a de-energized short heat tape. This review and any proposed corrective actions should be documented.
- 6.2.5 Review the possibility of providing a separate breaker for each short heat tape, so that they are completely independent. This review and any proposed corrective actions should be documented.
- 6.2.6 Counsel the OIU Operator to verify his conclusions prior to acknowledging alarms.
- 6.2.7 Determine whether other gaskets in the piping system related to the event of May 1 were affected by the overpressure situation. Replace as needed.

APPENDIX A. DISCUSSIONS REGARDING PHYSICAL CAUSE OF EVENT

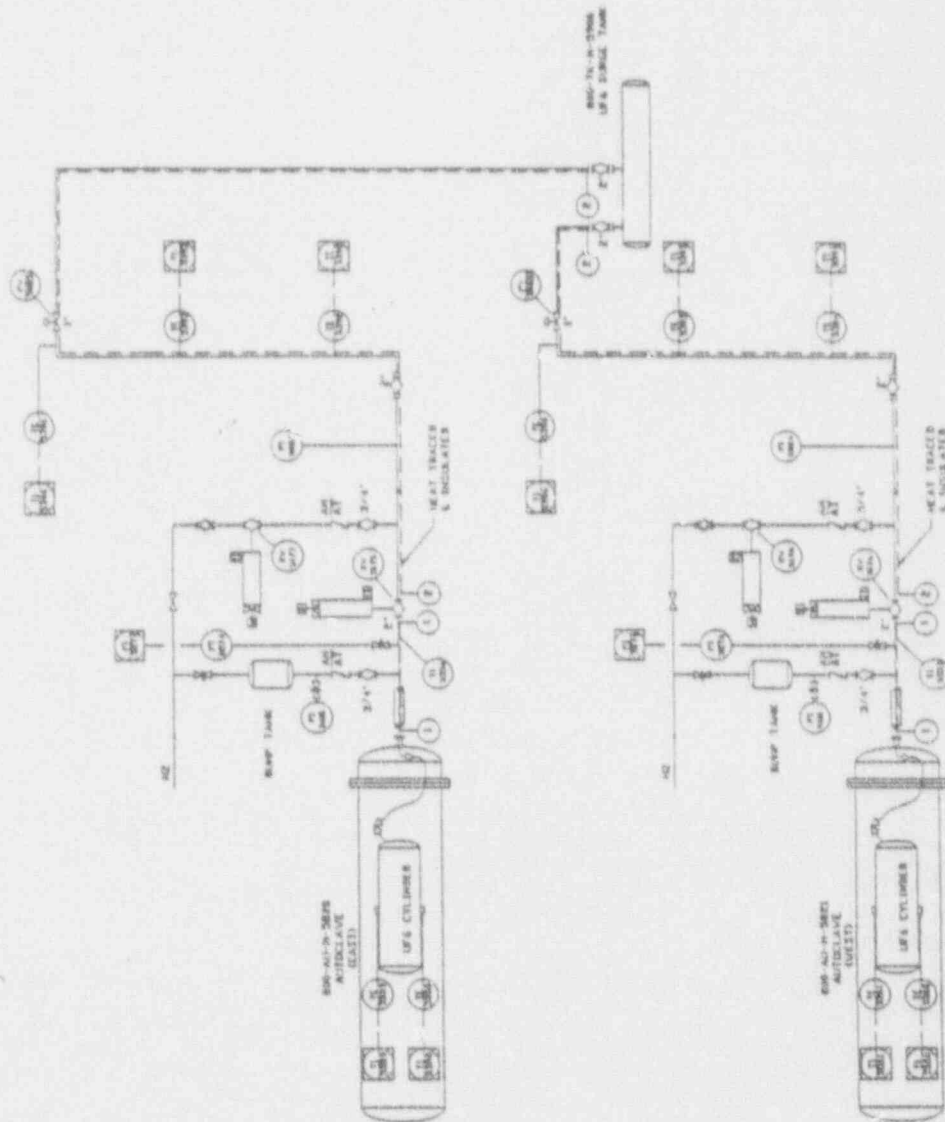
Physical Cause of Event: Turning off the breaker that controlled the heat tape for the AU-5821 piping and tubing resulted in creating a cold surface that allowed desublimation of UF_6 vapors. This created a pluggage which, when subsequently heated, pressurized an isolated section of piping, resulting in a small UF_6 release.

Hypothesis as to Physical Cause:

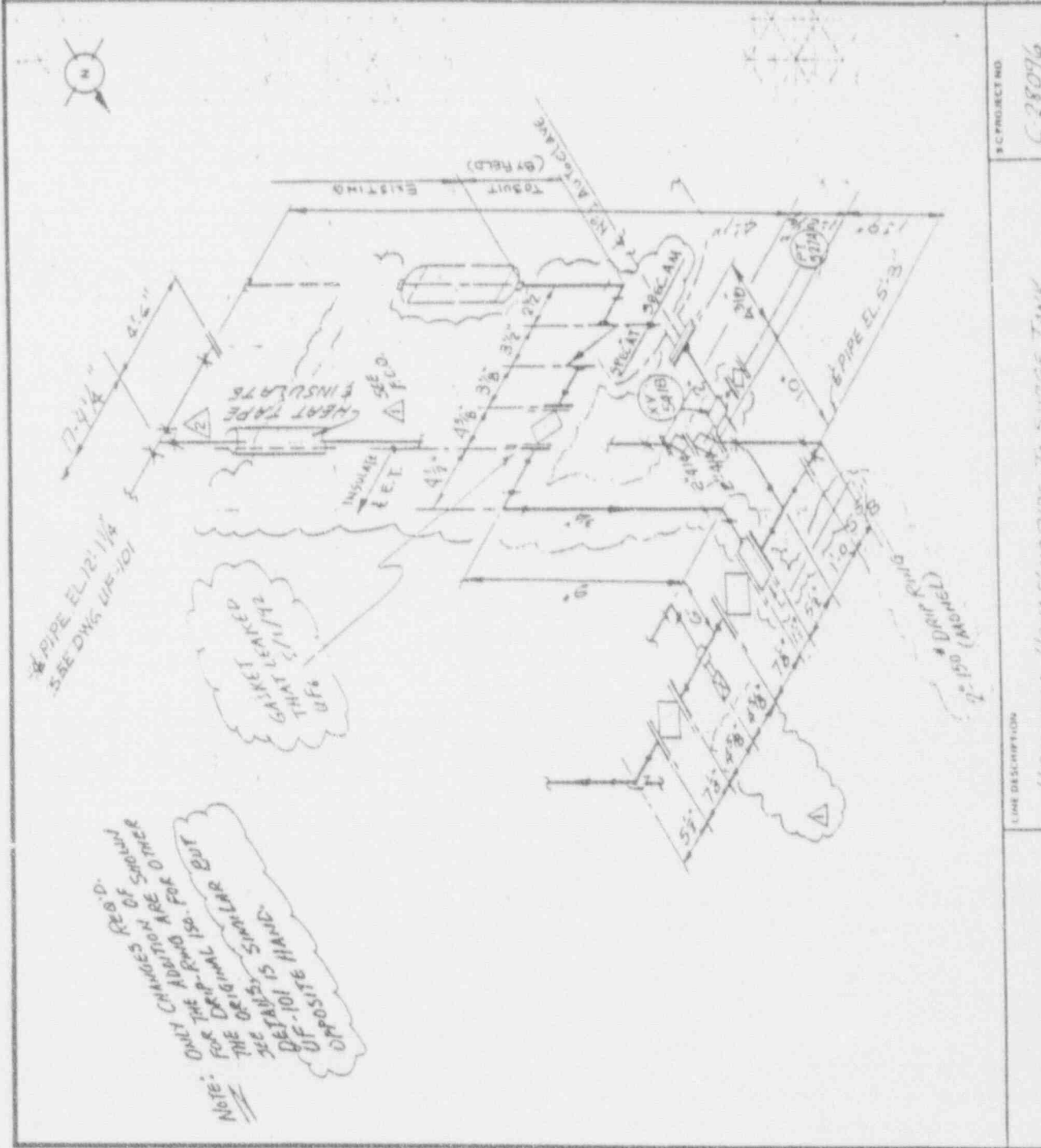
While the heating tape was off, UF_6 vapors from the hot cylinder in AU-5821 began desubliming in the piping and tubing outside the autoclave. This desublimation of UF_6 in the cool piping and tubing eventually formed a solid plug of material. When the heating tapes were turned back on, the UF_6 began liquefying and/or vaporizing inside a confined space. This was indicated by the steady rise in pigtail pressure as shown by PI-5276 between 1320 and 1350. The pressure (either gas pressure or hydraulic pressure due to expansion as solid UF_6 liquefied) eventually resulted in the failure of a flange gasket on the plug valve below the nitrogen bump tank.

UF_6 vapors from the hot cylinder would desublime at the point in the system where heat transfer would allow removal of the latent heat of desublimation. This would occur at a point in the system where the temperature is below the triple point temperature (147 F). The pigtail inside the autoclave would probably retain enough heat by conduction from the hot cylinder to prevent desublimation of UF_6 , even though the steam was off inside the autoclave. However, the piping outside the autoclave would be cold enough with no external heat tracing so that the UF_6 could easily desublime inside the piping and tubing between the autoclave head and valve XV-5176, which was closed. This is a very short section of piping, less than 4 feet of 2" piping. The nitrogen bump tank and the tap for the pressure transmitter, PT-5276 enter the UF_6 feed line just outside the autoclave head and in close proximity to each other. It is postulated that the pluggage of UF_6 formed so that a small isolated space was created upstream of the PT-5276 tap to the UF_6 feed line. Photos show that the UF_6 side of the plug valve below the nitrogen bump tank was jammed solid with UF_6 . As the heating tape supplied the heat necessary to melt and vaporize the solid UF_6 , the pressure rose as reflected accurately by PT-5276 (See OIU Trend Chart).

The maximum temperature shown by TC-5557 was only about 165 F, not sufficient alone to generate the pressures shown by PT-5276. The maximum pressure shown by PT-5276 of about 130 psia during the event could have been generated by a combination of UF_6 vapor pressure and inert gas in the lines that was compressed as the UF_6 expanded as it changed phase from solid to liquid.



YES	NO
SHOP FABRICATED	X
FIELD FABRICATED	
POST WELD HEAT TREAT	
ASME BOILER CODE	
PAINTING REQUIRED	
PIPING SPECIFICATION	AT
FLOWING MEDIUM	VAP X
CONDITION	TEMP
NORM OPER	235
DESIGN	
INSULATION	H C PP NONE
THICKNESS	
TRACING	YES NO
ELECTRICAL	X
COAT AND WRAP	
STRESS REVIEW REQD	X
DRAWN	DATE
CHECKED	DATE
MATERIAL	
STRESS	
APPROVED FOR (SEE SIGNATURE)	
REVISION APPD FOR CONST	DATE
1 ADDED DRUG RING	DATE
2 ADDED NEW LINE	DATE
3	
4	
FLOW DIAGRAM	PPING ENG
800-11-1504	800-11-5026
MODEL TABLE AREA	COLOR CODE
LINE NO	SHEET



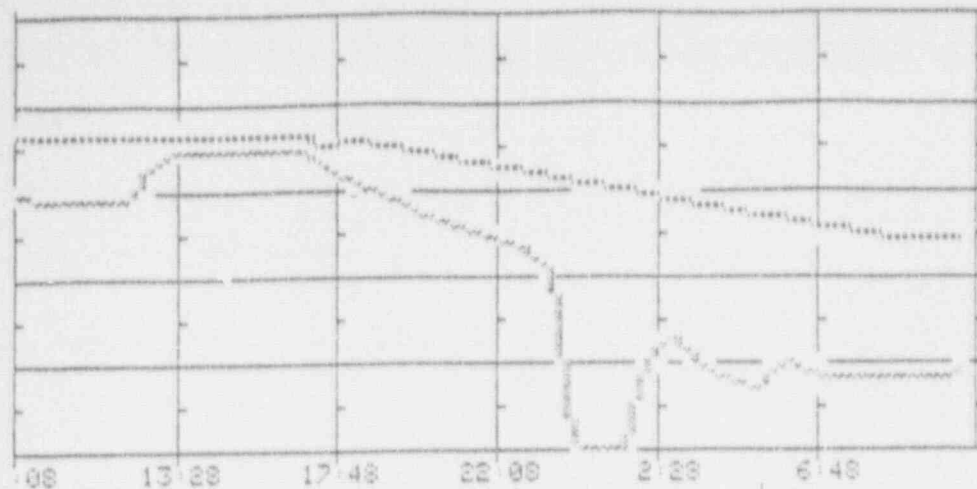
NOTE: ONLY CHANGES REB'D. SEE DETAILS OF SUMMER DE-101 IS HAND-OPPOSITE

PROJECT NO. C-28096
URANIUM HEXAFLUORIDE TO DUNGE TANK

04MAY92 MONDAY

ACQUIRED TRENDS

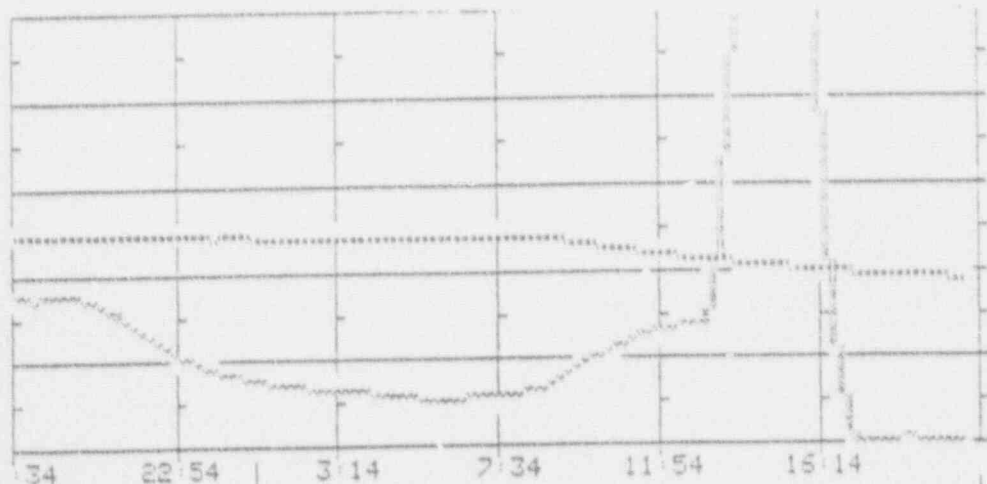
HD 2400/0 10-01-00



PI-5276 500.00
 SURF LINE 100.00
 13.84 PSI
 AVG 0.00

TI-5560 HEEL
 III 300.00
 162.50 DEG F
 AVG 0.00

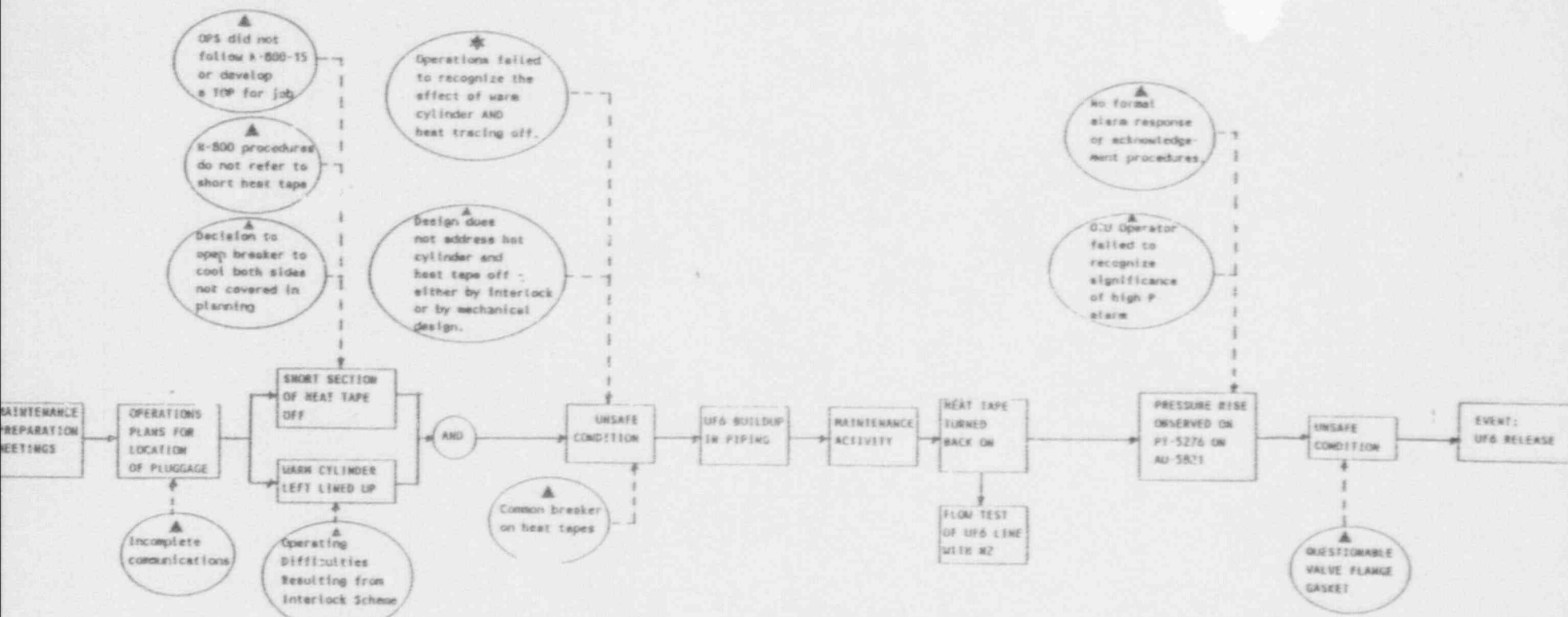
TIME = 5:17:00



PI-5276 500.00
 SURF LINE 100.00
 PSI 0.00
 AVG 0.00

TI-5560 HEEL
 III 300.00
 DEG F 0.00
 AVG 0.00

4/30/92 → ← 5/1/92 →



★ ROOT CAUSE
▲ CAUSAL FACTOR

INCIDENT CORRECTIVE ACTION PLAN

CONTAINMENT TENT FIRE, 4/30/92

DUF, RELEASE, 5/1/92

VACUUM HOSE FIRE, 5/2/92

PURPOSE: This plan defines corrective actions proposed in response to recommendations contained in the root cause analyses that were prepared by the Sequoyah staff for the incidents listed above. The plan contains "near-term" corrective actions, which will be performed prior to recommencing operation of the DUF, facility and proceeding to Phase 3 of the plant startup, as well as "long-term" corrective actions, which will be completed on a schedule as indicated below. The objective of this plan is to take prompt action to address the causal factors identified in the root cause analyses, followed by additional long-term changes to policies, procedures and training programs which will provide increased assurance of adherence to requirements.

PLAN OUTLINE

A. GENERIC SHORT-TERM ACTIONS

A.1 Define and implement a formalized Management Communication Notice (MCN) system which will be used to communicate to appropriate plant personnel the following types of information:

- * Special instructions or directives.
- * Policy interpretations.
- * Introduction of new policies or revised policies.

Due: 5/13/92

A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to defining operational steps required to take plant systems from the last procedural configuration to a configuration safe for turnover to maintenance for repair work, followed by return of these systems to a

*John Miller
5/13/92*

procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.

Due: 5/13/92

A.3 Issue a TOP establishing interim requirements for formalized safety assessments of non-routine activities, including:

- * Establishment of criteria for when such assessments are required. These criteria will be based on an interim definition of "safety-related" systems which should permit a graded approach to the assessments.
- * Definition of how the assessments are to be conducted. The scope of these assessments will include evaluation of the direct impacts of the proposed activity as well as a broader evaluation of potential impacts to other parts of the facility.
- * Definition of the level of approval required for non-routine activities.

Action: Prepare TOP

Due: 5/15/92

- A.4 Prepare and issue an interim alarm response TOP that describes requirements for assessment, response actions and logging of alarms received from safety-related systems. A preliminary definition and identification of safety-related alarms is to be included in this TOP, as well as a listing of the specific alarms to be included in this program.

Action: Prepare TOP

Due: 5/15/92

- A.5 Review and discuss the DUF₄ leak event and the two fires with all operations, waste management, engineering, maintenance and health and safety personnel. The topics to be covered include:

- * Descriptions of the events, to include a review of the physical properties of UF₆ that contributed to the leak at the DUF₄ facility.
- * Presentation of the root causes and recommended corrective actions.
- * Presentation of the corrective action plan and schedule.
- * Discussion of elements of the corrective action plan including the use of TOP's for non-routine activities, safety assessments of non-routine activities, the requirements for response to safety-related alarms.
- * Introduction to the MCN system and discussion of the MCN's to be issued in support of the corrective action plan. These include an initial MCN establishing the system and MCN's on use of TOP's for performance of non-routine activities and the prohibition of work on thermally hot systems.

Action: Prepare presentation materials.

Due: 5/13/92

Action: Schedule presentations

Due: 5/13/92

Action: Make training presentations to staff.

Due: 5/15/92

- A.6 Conduct lessons-learned sessions with all welders on the proper attachment of welding ground clamps. Discuss consequences of improper grounding including fire hazards and damage to other equipment.

Action: Prepare for and conduct sessions.

Due: 5/15/92

- A.7 Issue a TOP on enhanced requirements for fire prevention equipment during welding, grinding and cutting activities. (Currently presented as guidelines in the procedure.)

Action: Prepare TOP

Due: 5/15/92

- A.8 Issue a TOP on the use of EWP's to prevent inadvertent activation of electrically powered equipment during maintenance work on this equipment where activation could result in injury. Address cross-reference on the HWP.

Action: Prepare TOP

Due: 5/13/92

- A.9 Issue an MCN prohibiting non-routine or contact maintenance work on thermally hot equipment (>150°F) unless approved by the Senior Vice President.

Action: Prepare MCN

Due: 5/13/92

B. DUF₄-SPECIFIC NEAR-TERM ACTIONS

- B.1 Revise N-800 procedures to include precautions and define proper operation of the "short" heat tapes on the autoclave feed lines that share the same breaker.

Action: Issue TOP's as necessary.

Due: 5/15/92

- B.2 Counsel OIU operator on alarm response during leak event and operations staff involved in procedure violations identified in root cause analysis.

Action: Counsel personnel and document.

Due: 5/15/92

- B.3 Disassemble lines on the 5821 system that were exposed to high pressure during the leak incident. Remove entrapped UF₆ and UO₂F₂, inspect for damage and reassemble. Replace gaskets, recalibrate pressure transmitter, test heat tape, and reinsulate lines.

Action: Plan activities, document with HWP, EWP, and TOP, including safety assessment, and perform repairs.

Due: 5/15/92

- B.4 Prepare an interim safety evaluation of the short-term shutdown configuration for DUF₄ cylinders that are connected to the feed system and are not empty. Obtain PORC concurrence with the assessment and implement changes as appropriate.

Action: Perform review and make changes if necessary.

Due: 5/15/92

C. LONG-TERM ACTIONS

- C.1 Modify TOP procedure (G-002) to clarify it's use for proceduralizing non-routine activities in the facility.

Safety assessment requirements and approval levels must also be addressed.

Action: Issue TOP revising G-002 as necessary.

Due: 6/30/92

Justification for deferral: MCN issued per action A.2 to require preparation of a TOP for non-routine activities as an interim measure.

- C.2 Develop a formal policy on conduct of non-routine activities and activities not currently covered by procedures. Issue a TOP modifying G-001 as necessary to reflect these requirements.

Action: Develop policy and prepare TOP.

Due: 6/30/92

Justification for deferral: Interim policy established via an MCH per action A.2.

- C.3 Develop a formal process hazards awareness training program for operations managers, operators and engineers, PORC members, and other selected staff members. Evaluate contracting this action to a technical consultant specializing in this subject.

Action: Develop program and present to personnel.

Due: Plan - 7/1/92 Complete training - 9/1/92

Justification for deferral: This is an enhancement to the near-term actions that will provide further assurance of safe operation.

- C.4 Develop and issue a permanent procedure on alarm response, based on the TOP issued under action A.3. Train staff to requirements.

Action: Prepare procedure

Due: 8/15/92

Action: Train personnel

Due: 11/30/92

Action: Conduct engineering study of alarm requirements.

Due: 9/30/92

Justification for deferral: An interim alarm response TOP will be provided under action A.4.

- C.5 Perform a review of the alternatives of establishing a standard maintenance procedure on preparing gasketed flanges versus providing special training and requiring skills demonstration (similar to welder qualification). Document review and implement selected approach.

Action: Perform review and establish program.

Due: Complete review - 6/15/92

Develop program - 7/15/92

Train mechanics - 8/15/92

Justification for deferral: Leaking flanges have not been a serious problem in the past. The history does not warrant making this a prestart action.

- C.6 Perform an in-depth reassessment of the current configuration of heat tracing, cylinder valve interlocks and procedural controls for the DUF, autoclaves and feed lines. Develop and implement changes as appropriate to insure safe operation under foreseeable situations.

Action: Perform assessment

Due: 7/30/92

Action: Develop and implement changes

Due: 9/30/92

Justification for deferral: An interim safety evaluation is to be performed under action B.4.

- C.7 Evaluate the need to tag and/or log opening and closing

of electrical breakers when not covered by existing procedures.

Action: Perform evaluation

Due: 8/1/92

Justification for deferral: This is an area that was identified for assessment during the root cause analysis but was not a contributing factor to the leak. It is not considered to be an issue requiring immediate action.

- C.8 Locate suppliers and procure fire-retardant plastic sheeting for temporary containment enclosure construction.

Action: Identify supplier, issue purchase order.

Due: 5/30/92

Justification for deferral: The changes to the fire protection requirements instituted under action A.7 will minimize the potential for a temporary containment fire. Use of fire-retardant plastic is a further enhancement which is prudent but which need not be immediately implemented.

- C.9 Issue TOP to G-158 requiring the use of fire retardant plastic sheeting for construction of temporary containment enclosures.

Action: Prepare MCN

Due: 5/30/92

Justification for deferral: Procedure change not required until fire-retardant plastic is procured.

- C.10 Modify HWP procedure to reflect requirements for working on thermally hot systems.

Action: Issue TOP

Due: 8/15/92

Justification for deferral: Interim policy mandated by MCN per action A.9.

TABLE OF ROOT CAUSE ANALYSIS RECOMMENDED CORRECTIVE ACTIONS & CORRECTIVE ACTION PLAN

Generic Issues for Sequoyah Fuels:

ACTION

6.1.1.1 Develop a methodology for formalized systematic safety analyses in preparation for non-routine activities, thoroughly discussed and documented.

RESPONSE

A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to defining operational steps required to take plant systems from the last procedural configuration to a configuration safe for turnover to maintenance for repair work, followed by return of these systems to a procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.

A.3 Issue a TOP establishing interim requirements for formalized safety assessments of non-routine activities, including:

- * Establishment of criteria for when such assessments are required. These criteria will be based on an interim definition of "safety-related" systems which should permit a graded approach to the assessments.
- * Definition of how the assessments are to be conducted. The scope of these assessments will include evaluation of the direct impacts of the proposed activity as well as a broader evaluation of potential impacts to other parts of the facility.
- * Definition of the level of approval required for non-routine activities.

Handwritten note:
The main analysis
has been done. The analysis is
the same.

ACTION

6.1.2 Develop criteria for the type of non-routine activities that would require a formalized safety analysis.

RESPONSE

A.3 Issue a TOP establishing interim requirements for formalized safety assessments of non-routine activities, including:

- * Establishment of criteria for when such assessments are required. These criteria will be based on an interim definition of "safety-related" systems which should permit a graded approach to the assessments.
- * Definition of how the assessments are to be conducted. The scope of these assessments will include evaluation of the direct impacts of the proposed activity as well as a broader evaluation of potential impacts to other parts of the facility.
- * Definition of the level of approval required for non-routine activities.

ACTION

6.1.3 Determine the organizational level at which formal safety analyses would occur as appropriate for the particular type of event.

RESPONSE

A.3 Issue a TOP establishing interim requirements for formalized safety assessments of non-routine activities, including:

- * Establishment of criteria for when such assessments are required. These criteria will be based on an interim definition of "safety-related" systems which should permit a graded approach to the assessments.
- * Definition of how the assessments are to be conducted. The scope of these assessments will include evaluation of the direct impacts of the proposed activity as well as a broader evaluation of potential impacts to other parts of the facility.
- * Definition of the level of approval required for non-routine activities.

ACTION

6.1.4 Train supervisors in the principles of process hazards analysis to develop a thought process that emphasizes identification of hazards even when a formal review is not required.

ACTION

7 6.1.5 Develop approved procedures for non-routine activities after planning and safety analysis are complete.

RESPONSE

C.3 Develop a formal process hazards awareness training program for operations managers, operators and engineers, PORC members, and other selected staff members. Evaluate contracting this action to a technical consultant specializing in this subject.

RESPONSE

A.5 Review and discuss the DUF, leak event and the two fires with all operations, waste management, engineering, maintenance and health and safety personnel. The topics to be covered include:

- * Descriptions of the events, to include a review of the physical properties of UF₆ that contributed to the leak at the DUF₆ facility.
- * Presentation of the root causes and recommended corrective actions.
- * Presentation of the corrective action plan and schedule.
- * Discussion of elements of the corrective action plan including the use of TOP's for non-routine activities, safety assessments of non-routine activities, the requirements for response to safety-related alarms.
- * Introduction to the MCN system and discussion of the MCN's to be issued in support of the corrective action plan. These include an initial MCN establishing the system, and MCN's on use of TOP's, safety assessment of non-routine activities, responses to safety-related alarms, use of EWP's, work on thermally hot equipment, and enhanced fire watch requirements.

C.2 Develop a formal policy on conduct of non-routine activities and activities not currently covered by procedures. Issue a TOP modifying G-001 as necessary to reflect these requirements.

ACTION

- 6.1.6 Consider developing a new type of Temporary Operating Procedure that would require a more rigid review than normal TOPs in complex situations.

RESPONSE

- A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to defining operational steps required to take plant systems from the last procedural configuration to a configuration safe for turnover to maintenance for repair work, followed by return of these systems to a procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.
- C.1 Modify TOP procedure (G-002) to accommodate its use for proceduralizing non-routine activities in the facility. Safety assessment requirements and approval levels must also be addressed.

ACTION

- 6.1.7 Revise G-002 (Temporary Operating Procedure) to more clearly indicate when a TOP is required. The present revision seems to leave preparation of a TOP optional in many cases, which is not the intent.

RESPONSE

- A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to defining operational steps required to take plant systems from the last procedural configuration to a configuration safe for turnover to maintenance for repair work, followed by return of these systems to a procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.
- C.1 Modify TOP procedure (G-002) to accommodate its use for proceduralizing non-routine activities in the facility. Safety assessment requirements and approval levels must also be addressed.

ACTION

6.1.8 Re-emphasize the need for procedural compliance at all times. The requirement for procedural compliance especially needs to be stated in the case of non-routine activities.

RESPONSE

- A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to repair work, followed by return of these systems to a procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.
- A.5 Review and discuss the DUF, leak event and the two fires with all operations, waste management, engineering, maintenance and health and safety personnel. The topics to be covered include:
- * Descriptions of the events, to include a review of the physical properties of UF₆ that contributed to the leak at the DUF₆ facility.
 - * Presentation of the root causes and recommended corrective actions.
 - * Presentation of the corrective action plan and schedule.
 - * Discussion of elements of the corrective action plan including the use of TOP's for non-routine activities, safety assessments of non-routine activities, the requirements for response to safety-related alarms.
 - * Introduction to the MCN system and discussion of the MCN's to be issued in support of the corrective action plan. These include an initial MCN establishing the system, and MCN's on use of TOP's, safety assessment of non-routine activities, responses to safety-related alarms, use of EWP's, work on thermally hot equipment, and enhanced fire watch requirements.
- C.2 Develop a formal policy on conduct of non-routine activities and activities not currently covered by procedures. Issue a TOP modifying G-001 as necessary to reflect these requirements.

ACTION

6.1.9 The meaning of "full procedural compliance" needs to be clarified. In cases in which the procedure does not address a particular area (e.g. an activity that may be encountered infrequently), these omissions must be identified and handled through preparation of a TOP, procedure revision, or new procedure.

RESPONSE

A.2 Issue an MCN on the required use of TOP's to document and obtain approval for steps to be taken for non-routine activities not covered by procedures. Special emphasis is to be given to repair work, followed by return of these systems to a procedural configuration. System troubleshooting and testing to verify readiness to operate following maintenance will also be covered in this MCN.

A.5 Review and discuss the DUF, leak event and the two fires with all operations, waste management, engineering, maintenance and health and safety personnel. The topics to be covered include:

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C.2 Develop a formal policy on conduct of non-routine activities and activities not currently covered by procedures. Issue a TOP modifying G-001 as necessary to reflect these requirements.

ACTION

6.1.10

Review the need for procedural guidance on response to alarms. This review and any resulting corrective actions should be documented.

RESPONSE

- A.4 Prepare and issue an interim alarm response TOP that describes requirements for assessment, response actions and logging of alarms received from safety-related systems. A preliminary definition and identification of safety-related alarms is to be included in this TOP, as well as a listing of the specific alarms to be included in this program.
- C.4 Develop and issue a permanent procedure on alarm response, based on the TOP issued under action A.3. Train staff to requirements.

ACTION

6.1.11

Review whether a standard maintenance procedure for preparing gasketed flanges should be developed or should the training and job skills required of a mechanic be considered sufficient. The review and any proposed corrective actions should be documented.

RESPONSE

- C.5 Perform a review of the alternatives of establishing a standard maintenance procedure on preparing gasketed flanges versus providing special training and requiring skills demonstration (similar to welder qualification). Document review and implement selected approach.

ACTION

6.1.12

All Control Room Operators should be trained on proper response for non-routine situations.

RESPONSE

- A.3 Issue a TOP establishing interim requirements for formalized safety assessments of non-routine activities, including:
- * Establishment of criteria for when such assessments are required. These criteria will be based on an interim definition of "safety-related" systems which should permit a graded approach to the assessments.
 - * Definition of how the assessments are to be conducted. The scope of these assessments will include evaluation of the direct impacts of the proposed activity as well as a broader evaluation of potential impacts to other parts of the facility.
 - * Definition of the level of approval required for non-routine activities.
- A.5 Review and discuss the DUF, leak event and the two fires with all operations, waste management, engineering, maintenance and health and safety personnel. The topics to be covered include:
- * Descriptions of the events, to include a review of the physical properties of UF₆ that contributed to the leak at the DUF₆ facility.
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- C.4 Develop and issue a permanent procedure on alarm response, based on the TOP issued under action A.3. Train staff to requirements.

Issues Pertinent Only to the Depleted UF₆ Plant:

ACTION

- 6.2.1 Revise N-800 procedures to include the proper operation of the short heat tapes between the fixed head of the autoclaves and the UF₆ feed valves.

RESPONSE

- B.1 Revise N-800 procedures to include precautions and define proper operation of the "short" heat tapes on the autoclave feed lines that share the same breaker.

ACTION

- 6.2.2 Review the applicable N-800 procedures (N-800-15 and possibly N-800-2) to assess safety implications in the event that heat tracing is inadvertently de-energized. Determine whether it is acceptable to leave cylinder valves open for short-term shutdowns. This review and any proposed corrective actions should be documented.

RESPONSE

- B.4 Prepare an interim safety evaluation of the short-term shutdown configuration for DUF₆ cylinders that are connected to the feed system and are not empty. Obtain PORC concurrence with the assessment and implement as appropriate.
- C.6 Perform an in-depth reassessment of the current configuration of heat tracing, cylinder valve interlocks and procedural controls for the DUF₆ autoclaves and feed lines. Develop and implement changes as appropriate to insure safe operation under foreseeable situations.

ACTION

- 6.2.3 Review the interlock scheme which seems to lead to the need to leave cylinder valves open during short-term shutdowns. Determine whether any changes to the interlock scheme ease of operability and safety. This review and any proposed corrective actions should be documented.

RESPONSE

- B.4 Prepare an interim safety evaluation of the short-term shutdown configuration for DUF₆ cylinders that are connected to the feed system and are not empty. Obtain PORC concurrence with the assessment and implement as appropriate.
- C.6 Perform an in-depth reassessment of the current configuration of heat tracing, cylinder valve interlocks and procedural controls for the DUF₆ autoclaves and feed lines. Develop and implement changes as appropriate to insure safe operation under foreseeable situations.

ACTION

- 6.2.4 Review the need for an interlock to address the situation of an open cylinder valve and a de-energized short heat tape. This review and any proposed corrective actions should be documented.

ACTION

- 6.2.5 Review the possibility of providing a separate breaker for each short heat tape, so that they are completely independent. This review and any proposed corrective actions should be documented.

ACTION

- 6.2.6 Counsel the OIU Operator to verify his conclusions prior to acknowledging alarms.

ACTION

- 6.2.7 Determine whether other gaskets in the piping system related to the event of May 1 were affected by the overpressure situation. Replace as needed.

RESPONSE

- B.4 Prepare an interim safety evaluation of the short-term shutdown configuration for DUF, cylinders that are connected to the feed system and are not empty. Obtain PORC concurrence with the assessment and implement as appropriate.

- C.6 Perform an in-depth reassessment of the current configuration of heat tracing, cylinder valve interlocks and procedural controls for the DUF, autoclaves and feed lines. Develop and implement changes as appropriate to insure safe operation under foreseeable situations.

RESPONSE

- B.4 Prepare an interim safety evaluation of the short-term shutdown configuration for DUF, cylinders that are connected to the feed system and are not empty. Obtain PORC concurrence with the assessment and implement as appropriate.

- C.6 Perform an in-depth reassessment of the current configuration of heat tracing, cylinder valve interlocks and procedural controls for the DUF, autoclaves and feed lines. Develop and implement changes as appropriate to insure safe operation under foreseeable situations.

RESPONSE

- B.2 Counsel OIU operator on alarm response during leak event and operations staff involved in procedure violations identified in root cause analysis.

RESPONSE

- B.3 Disassemble lines on the 5821 system that were exposed to high pressure during the leak incident. Remove entrapped UF_6 and UO_2F_2 , inspect for damage and reassemble. Replace gaskets, recalibrate pressure transmitter, test heat tape, and reinsulate lines.