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Doc: G. E. Eslinger

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October 28, 1990

Ms. M. A. Fisher, Branch Chief
W. A. R. Engineering, 4410 Branch
Cable Operations Office - DOE
155 DOE Building
2400 13th St. SW, Bldg C
Washington, DC 20545

EXPERIENCES IN TRANSFER OF CANISTERS FROM THE TN-24P CASK TO THE
VSC-17 CONCRETE CASK - MS-95-90

Dear Ms. Fisher:

The following will serve to document the operational experiences encountered
in the transfer of consolidated fuel canisters from the TN-24P metal spent
fuel storage cask to the VSC-17 concrete spent fuel storage cask. This work
was part of the activities leading to the testing of the VSC-17 cask in
accordance with Cooperative Agreement DE-FC06-80OR11354 and the terms and
conditions of that agreement.

The essence of this letter shall also become part of the data report
provided at the conclusion of the test activities for the VSC-17 and,
therefore, a part of the final report documentation related to the DOE-ORRM
effort on small concrete cask testing.

Preparatory to fuel transfer, the casks were staged in accordance with
procedures in place. A problem developed with placement of the TN-24P in
the predetermined location because a protrusion on the side could not be
negotiated with the cask transporter as projected. Accordingly, delays were
encountered while the project had the Hot Shop floor reanalyzed for
placement of the TN-24P cask 12 in. to the south of grade beam 13;
centerline instead of directly on beam centerline as planned.

Other activities preparatory to fuel transfer went according to projections
and timing of removal, placement of plastics, and so forth. The transfer
operation was initiated by mid-day, September 27, 1990. The transfer
operation was initiated with the intent to complete the operation including
replacement of lids for a stable configuration using overtime hours as
required.

*Please note that the experiences noted are
with consolidated canisters which are
dimensionally a tighter fit than with normal
spent fuel assemblies. Dick Schmitt*

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EGG
P. C. Goodrich - Idaho Falls, ID 83415

NF-16

Transfer cask:
number 18, con-
tained approxi-
mately 1000 lbs
of fuel. This
cask was used
for the transfer
of fuel from the
TN-24P cask to
the VSC-17 cask.
The cask was
loaded with fuel
assemblies and
was transported
to the VSC-17
cask. The transfer
operation was
completed on
September 27, 1990.
The VSC-17 cask
was then loaded
with fuel from
the TN-24P cask.
The transfer
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September 27, 1990.
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The assembly (three of four tried) could not be removed from the TN-24P
in a 1974 equivalent to that which had been used several years ago to
take them in the cask and subsequently tested that had moved them around
after thermal strap (the lift fixture limit was established at
500 lbs corresponding to that used in the previous work. The information
about existing loading of canisters was established from conversation
with project personnel from that time and verified through PNL personnel.
The force applied to lift the assembly was not large since canister
weight is also nominally about 2350 lbs; nevertheless, the canisters had
to be moved through thermally existing bowing, corrosion, or other
obstacles. It was stopped while project personnel examined engineering files
to evaluate lift fixture and canister lifting leg capacities. Based on that
review a decision was approved by the project, the facility manager, and a
cask representative to revise procedures to increase net force to canister
lift to 500 lbs. Operations resumed later in the day with instructions to
record breakaway forces, constant lift force and so forth since it was
recognized that we would be acquiring previous/unaccounted data.
Subsequent operations that evening resulted in partial lifts of all
assemblies needed for testing the YCC-17 at which time operations were
stopped because of late shifts and the need to have time to stop in a stable
configuration (lids on casks, etc.).

Discussions were held with PNL personnel to identify alternate canisters to
be used in the TN-24P. The canisters could not be removed from the TN-24P
cask.
Transfer operations resumed October 4, 1990. One of the canisters, canister
number 18, could not be removed from the TN-24P cask. The canister was
lifted approximately 18 in. at which time the limiting force of 4000 lbs was
reached. This assembly was lowered back into the TN-24P cask and an
alternate assembly was selected. The "breakaway" forces required to remove
the assemblies are provided in attached Table 1. Video tapes were made and
observations recorded such as strapping on all four sides of canister 18
during the removal attempt.

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TN-24P cask
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 of canister 18

E H B

Hot Shop
- Hot Shop

The cost of the project for extending these fuel canisters from the 74-242
 to the 74-244 is estimated to be approximately \$100,000. This cost includes
 the purchase of new equipment, the cost of labor, and the cost of materials.
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 purchase of new equipment, the cost of labor, and the cost of materials.

cc: ID Project Engineer
 as stated

R. C. Schmitt, Manager
 Case Transport and Testing Program

Sincerely,

E H B

• After fuel
 started
 • Fuel canisters

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TN-24P CANISTER PULLING FORCE

TN-24P Location	Canister Number	Breakaway Force (lbs)
A1	12	3180
A2	21	3020
A4	16	3020
A5	24	3250
A6	8	3002
B1	10	3010
B2	19	3331
B3	18	3110*
B5	17	3350
B6	9	3030
C1	11	3000
C2	15	3028
C3	6	3070
C6	2	3090
O1	13	3280
O3	4	3050**
O5	23	3350
O6	3	3050

18

After fuel canister was lifted approximately 2 inches, pull forces started to increase until the maximum force of 4000 was reached.

** Fuel canister number 4 was used as a spare for canister 18.



Ms. M. W. F...
 Civilian Radi...
 Idaho Operat...
 785 SOE Place
 Idaho Falls,

EVALUATION OF
 (A) THE "STUC
 OPERATIONS."

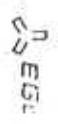
Dear Ms. F...

The following
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cc: J. G. Dineen, MS 9109
 L. E. Sillinger, MS 9109
 M. A. Franz, MS 9208
 L. P. Lach, MS 3940
 G. P. Frohman, MS 3920
 R. C. Schmitz, file
 Central files

November 21, 1990

Ms. M. W. Fisher, Branch Chief
 Civilian Radioactive Waste Branch
 Idaho Operations Office - DOE
 785 DOE Place
 Idaho Falls, ID 83402

EVALUATION OF OPTIONS, ASSOCIATED COSTS, AND RECOMMENDATIONS FOR:
 (A) THE "STUCK" FUEL CANISTER IN THE TN-24P CASK, (B) RELATED CASK MOVE
 OPERATIONS, AND (C) RESOLUTION OF VSC-17 PRESSURE BEHAVIOR - RCS-111-50

Dear Ms. Fisher:

The following provides an assessment of options, costs, and recommendations regarding the "stuck" fuel assembly, related cask operations, and the VSC-17 cask pressure behavior.

Review of Stuck Fuel Assembly Issue

Please recall that during transfer of fuel from the TN-24P cask to the VSC-17 cask, consultant casker number 18 was withdrawn about 12 inches from the TN-24P cask at which time the 4,000 lb lifting limit of the lifting fixture and the canister lifting tugs was reached. Subsequently, the canister was returned to its seated position and an alternative canister was selected for testing in the VSC-17. The lifting limit had been increased from the 3,000 lbs of previous operations to 4,000 lbs to overcome the "breakaway" force that was unexpectedly encountered in the removal of canister after several years of storage in the TN-24P. The increase to a 4,000 lb lift limit was derived based on the initial design and load test of the lifting fixture of 6,000 lbs and the load test of the canister at 4,000 lbs.

The lift operation was video taped and stress marks were observed on all four tines of canister number 18. Whereas, normal expansion of the canister is the most probable cause, bowing, twisting or other mechanical cannot be eliminated as possible. We presently have insufficient data to determine the root cause but accessing the assembly of the canister is not feasible with the lift. For the other six canisters in the TN-24P, it is considered, although not probable, that additional canisters

Canisters?

EGEG, P.O. Box 525, Idaho Falls, ID 83415

This activity currently ongoing as of 11/16/90

Ms. M. W. Fisher
 November 28, 1990
 RCS-111-90
 Page 2

may be unrecovered stuck because of placement in the

Costs for Address

One possibility: simply to apply become stuck to be incurred.

of the canister Rigging Manual Engineering to calibrating the conservatism has is no assurance assessment of t about a factor realistic. Cost

A second part assuming success to place it in (more clearance VSC-17 and TN-24P. In the TN-24P, VSC-17, replacement. Additionally, be completed to about

Issue of Perma-

Another issue be installed estimate to place fact that lid shielding and procedural changes include a thin on bolting).

Issue of Urus

The final cost cask, project issue include testing to re

M. W. Fisher
November 28, 1990
RCS-111-90
Page 2

may be unrecoverable, it is also possible that canister number 18 is no longer stuck because of thermal unloading of the basket following the removal and placement in the VSC-17 cask of 17 fuel canisters.

Costs for Additional Analyses and Operations for the Stuck Assembly

One possibility for removing canister number 18 from the TN-24P cask is simply to apply more lift. The major risks are that the assembly might become stuck in a partially withdrawn position or that canister damage might be incurred. To assess applying more lift involves reanalyzing the design of the canister and obtaining one-time exemptions to exceed DOE Hoisting and Rigging Manual restrictions. The CTRP has received an estimate of \$500,000 from Engineering to analyze the lifting fixture and canister design and determine methodology to remove the stuck fuel canister. The estimate includes conservatism based on the uncertainties involved and, unfortunately, there is no assurance of a useful result. The CTRP has independently prepared an assessment of the task and believe that the estimate from Engineering is about a factor of two too large. Accordingly, \$250,000 is expected to be more realistic. Costs could be less if a "dead end" is encountered early.

A second part of the problem would involve what to do with the canister assuming success in extracting it from the TN-24P. One solution would be to place it in the VSC-17 where the canister ports are dimensionally relaxed (more clearance). This requires a number of operations: removal of the VSC-17 and TN-24P lids, removal of a canister from the VSC-17 and placement in the TN-24P, removal of canister 18 from the TN-24P and placement in the VSC-17, replacement of lids, pumpdown and backfill of both casks, and etc. Additionally, partial lifts of the other six canisters in the TN-24P would be completed to assure removability. Our estimate for these operations is about \$100,000.

Issue of Permanent Lids on TN-24P

Another issue is the Hot Shop inquiry (or request) that the permanent lids be installed on the TN-24P when it is returned to the pad this summer. Estimate to place the permanent lids on the cask is \$100,000 which includes the fact that lid placement fixtures need to be designed and fabricated, special shielding and/or remote handling capabilities are required, and numerous procedural changes are necessary (please recall that the permanent lids include a thin inner lid where shielding is inadequate for personnel to work on bolting).

Issue of Unusual Pressure Behavior in the VSC-17 Cask

The final issue is the unusual pressure behavior observed in the VSC-17 cask, principally during initial startup and early test runs. The issue includes your request to evaluate the possibility of laboratory scale testing to research the cause of the pressure behavior. It is the project's

This activity currently ongoing as of 11/19/92

M. W. Fisher
November 28, 1990
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Page 4

VSC-17 Pressure Behavior

Laboratory testing for evaluation of the data unacceptable for identifying: obtaining data as of November 1990 is not project's efforts of PNL and others. Your consideration of the accordingly are requested.

cc: D. Hixon, DOE-10, MS
DOE Project Engineer

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the TN-24P cask is the assembly might that canister damage might reanalyzing the design exceed DOE Hotelling and an estimate of from later design and determine reliable includes 1. unfortunately, there independently prepared an from Engineering is expected to be more encountered early.

10 With the canister One solution would be are dimensionally relaxed ions: removal of the the VSC-17 and placement IP and placement in the of both casks, and etc. ars in the TN-24P would for these operations is

that the permanent lids be pad this time. Our which includes the and fabricated, special required, and numerous the permanent lids site for personnel to work

erved in the VSC-17 ly test runs. The ility of laboratory seals or. It is the project's

M. V. Fishart
November 28, 1992
RCS-111-90
Page 4

VSC-17 Pressure Behavior The project recommends no action regarding laboratory testing for evaluating the VSC-17 cask pressure behavior unless the evaluation of the data obtained during testing of the VSC-17 cask proves unacceptable for identifying the observed behavior. Since we are still obtaining data as of November-28, 1990, a completion schedule for the evaluation is not projected at this time. The evaluation includes the efforts of PNL and others not in the project.

Your consideration of the above recommendations and your directions accordingly are requested.

Sincerely,

R.C. Schmitt
R. C. Schmitt, Manager
Cask Transport and Testing Project

cc: D. Hixon, DOE-10, MS 1110
DOE Project Engineer

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