



South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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File No.: G25
10 CFR 50, Appendix H

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498 & 50-499
Reactor Vessel Material Surveillance Capsule Removal - Revision


Reference: Brandon Jenewein, STP Nuclear Operating Company, to NRC Document Control Desk, "Reactor Vessel Material Surveillance Capsule – Schedule Change," dated August 13, 2008 (NOC-AE-08002329) (ML082330456)

STP Nuclear Operating Company (STPNOC) provides notification to the Nuclear Regulatory Commission of a revision in the planned withdrawal of material specimens exposed in reactor pressure vessel surveillance capsules. Details of the schedule in effect were provided in the referenced correspondence, with one capsule per unit to be withdrawn during refueling outages 1RE16 and 2RE15. With this revision, capsule W will be pulled during 1RE16 and 2RE15 in place of capsule X. The remaining capsules will remain in place pending further determination. Justification for the revision is provided in the attachment. Updated Final Safety Analysis Report (UFSAR) pages to be revised are included. Withdrawing different capsules in 1RE16 and 2RE15 than those originally designated meets 10 CFR 50.59 review criteria for approval.

The intent of this correspondence is to inform the NRC staff of the change in the capsule selected for withdrawal. STPNOC is not requesting any action by the NRC.

There are no commitments in this letter.

If there are any questions, please contact either Mr. Philip Walker at (361) 972-8392 or me at (361) 972-7904.


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PLW

Attachment: Revised Reactor Vessel Material Surveillance Capsule Removal

STI: 32845410

A008
NRC

cc:

(paper copy)

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**SOUTH TEXAS PROJECT
UNITS 1 AND 2
REVISED REACTOR VESSEL MATERIAL
SURVEILLANCE CAPSULE REMOVAL**

I. SUMMARY

The previously stated surveillance capsule removal schedule specified capsule X would be removed during refueling outages 1RE16 and 2RE15. Due to limited access to capsule X, capsule W will be pulled instead. NRC approval to utilize an alternate capsule is not considered necessary.

II. BACKGROUND

10 CFR 50, Appendix H.III, requires a material surveillance program for reactor pressure vessels where the peak neutron fluence at the end of the design life of the vessel will exceed $1.0 \text{ E}17 \text{ n/cm}^2$ ($E > 1 \text{ MeV}$). Neutron fluence at the South Texas Project exceeds this level. Consequently, STP Nuclear Operating Company (STPNOC) has implemented a material surveillance program consistent with Appendix H for South Texas Project (STP) Units 1 and 2 in which material specimens are exposed to neutron fluence in reactor vessel surveillance capsules and then withdrawn from the reactor vessel for fracture toughness testing. A description of the surveillance program is provided in WCAP-9492 and WCAP-9967, "Reactor Vessel Radiation Surveillance Program," for Units 1 and 2, respectively. The surveillance program was initially established to cover the 40-year design life of the reactor pressure vessel.

The capsule withdrawal schedule is consistent with the requirements of ASTM E185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." As noted in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Section X1.M31, "Reactor Vessel Surveillance," changes to the capsule withdrawal schedule are to be approved by the NRC prior to implementation. However, STPNOC is only substituting an equally exposed capsule for the capsule previously intended for removal, with no changes in the timing of removal.

III. PROPOSED REVISION TO THE WITHDRAWAL SCHEDULE

One surveillance capsule per unit will be withdrawn during 1RE16 and 2RE15. Capsule W will be pulled instead of capsule X. The surveillance specimens will have been exposed to neutron fluence for an estimated 18 EFY by that time. This withdrawal campaign is depicted in the attached STP UFSAR Table 16.1-2, "Reactor Vessel Material Surveillance Program – Withdrawal Schedule." The remaining capsules will be left in place pending further determination.

IV. REASON FOR THE PROPOSED REVISION TO THE WITHDRAWAL SCHEDULE

Equipment in place around the reactor pressure vessel needed to conduct a refueling operation block access to the location where capsule X is positioned. Achieving access requires that equipment be repositioned, a process that makes capsule removal a critical path activity and potentially lengthening the duration of the refueling outage. Achieving access to capsule W for removal is not a critical path activity.

V. JUSTIFICATION

Surveillance Capsules U, V, and Y

Three material surveillance capsules have been withdrawn from each unit: U, Y, and V from Unit 1, and V, Y, and U from Unit 2. Most recently, capsule V was removed from Unit 1 after 11.13 EFPY of exposure, and capsule U was removed from Unit 2 after 10.31 EFPY of exposure. The schedule for capsule withdrawal was established consistent with the guidelines of ASTM E185-82 based on the predicted End-of-Life (EOL) ΔRT_{ndt} for the reactor vessel beltline materials.

Charpy V-notch testing was performed on surveillance capsules U, Y, and V from Unit 1, and capsules V, Y, and U from Unit 2. The results are documented in WCAP-16149 Revision 2 (reference 1) and WCAP-16093 Revision 2 (reference 2). The 30 ft-lb EOL transition temperature increases for the surveillance capsule materials following irradiation do not exceed 100°F. For these limited changes in ΔRT_{ndt} , ASTM E185-82 Table 1 recommends that a minimum of three surveillance capsules be withdrawn per unit to support an operating life of 40 years. Therefore, Unit 1 and Unit 2 have satisfied this criterion for monitoring neutron embrittlement, and no further samples are needed to support operation to the end of the licensed 40-year life of the units.

Based on the above, the proposed change in the capsule selected for withdrawal will have no adverse impact on assurance of reactor vessel integrity over the remainder of the 40-year license(s).

Surveillance Capsules X, W, and Z

There are three surveillance capsules remaining in each reactor pressure vessel (X, W, and Z). See the attached figure. STPNOC has submitted an application to the NRC to extend the licensed operating life of the Unit 1 and 2 (reference 3). Capsule X (both units) was intended to be the source for data to qualify operation for 60 years to support license renewal for the extended plant life. Capsule X was initially chosen because it has the highest lead factor of the three remaining capsules in both units (Table 2). However, the difference between lead factors for X and W is not significant (about 1%).

Per ASTM E185-82, the EOL capsule is withdrawn when neutron fluence exposure at end-of-life is not less than once or greater than twice the peak EOL vessel fluence. Assuming the same guidance applies to an End-of-Life-Extension (EOLE) capsule, the allowed Unit 1 neutron fluence range is 3.86 E19 to 7.72 E19 n/cm², and 3.73 E19 to 7.46 E19 n/cm² for Unit 2 (based on Table 6-3 of WCAP-16149, Rev. 2 and WCAP-16093, Rev. 2, assuming 54 EFPY at EOLE). At the time of extraction in 1RE16 and 2RE15, Units 1 and 2 will be at approximately 18 EFPY. The approximate neutron fluence exposures of capsule W at withdrawal are:

Unit 1 Capsule W: ~4.33 E19 n/cm²

Unit 2 Capsule W: ~4.14 E19 n/cm²

These values are within the allowed range for cumulative neutron fluence at EOLE.

Conclusion

The intent of this surveillance will continue to be met with this change. A capsule will be removed from each unit according to the approved schedule. With this choice of a different capsule for extraction: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the revised withdrawal schedule; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) issuance of the change in the selected capsule will not be inimical to the common defense and security or to the health and safety of the public. Therefore, pulling capsule W instead of capsule X is acceptable.

VI. REFERENCES

1. WCAP-16149 Revision 2, "Analysis of Capsule V from the South Texas Project Nuclear Operating Company, South Texas Unit 1 Reactor Vessel Radiation Surveillance Program"
2. WCAP-16093 Revision 2, "Analysis of Capsule U from the South Texas Project Nuclear Operating Company, South Texas Unit 2 Reactor Vessel Radiation Surveillance Program"
3. G. T. Powell, STP Nuclear Operating Company, to NRC Document Control Desk, "License Renewal Application," dated October 25, 2010 (NOC-AE-10002607)

**TABLE 1
 IRRADIATED SPECIMEN NEUTRON FLUENCE EXPOSURE**

UNIT 1	CAPSULE	CYCLE	CUMULATIVE IRRADIATION TIME (EFPY)	NEUTRON FLUENCE (n/cm²)
	U	1	0.78 (Actual)	0.26 E19
	Y	6	4.90 (Actual)	1.29 E19
	V	11	11.13 (Actual)	2.62 E19
	X	NA	NA	NA
	W	16	18 (Estimate)	4.33 E19 (Estimate)
	Z	NA	NA	NA

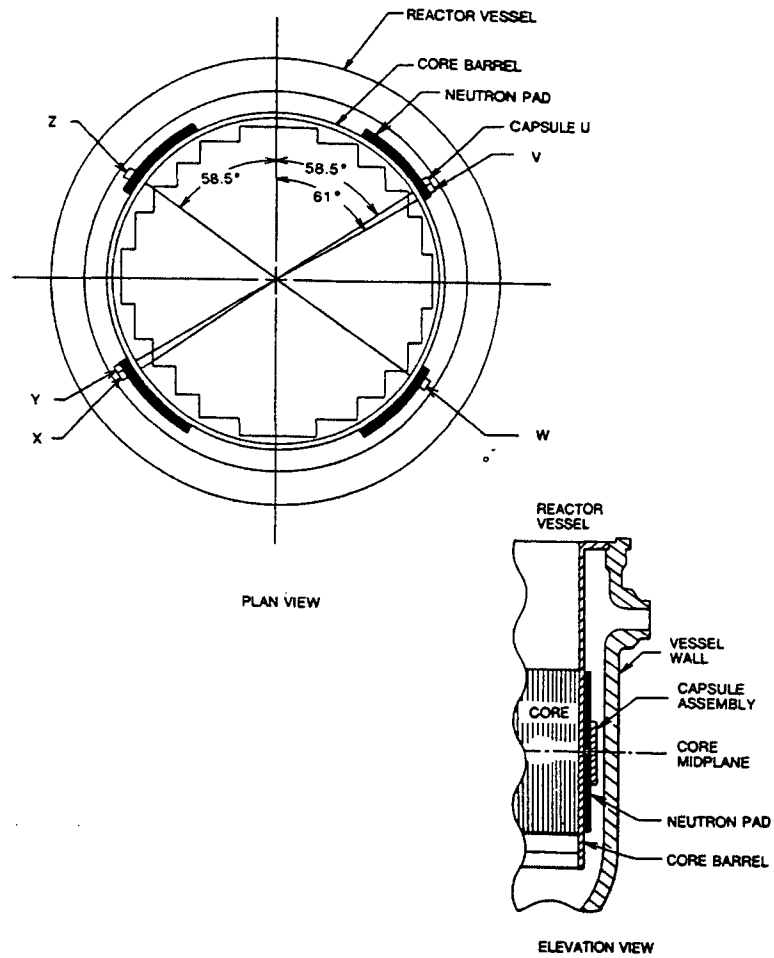
UNIT 2	CAPSULE	CYCLE	CUMULATIVE IRRADIATION TIME (EFPY)	NEUTRON FLUENCE (n/cm²)
	V	1	0.87 (Actual)	0.34 E19
	Y	5	5.13 (Actual)	1.21 E19
	U	9	10.31 (Actual)	2.40 E19
	X	NA	NA	NA
	W	15	18 (Estimate)	4.14 E19 (Estimate)
Z	NA	NA	NA	

**TABLE 2
 IRRADIATED SPECIMEN EFFECTIVE EXPOSURE**

UNIT 1	CAPSULE	CYCLE	CUMULATIVE IRRADIATION TIME (EFPY)	LEAD FACTOR	EFFECTIVE EXPOSURE (YR)
	U	1	0.78 (Actual)	3.59	2.80
	Y	6	4.90 (Actual)	3.28	16.07
	V	11	11.13 (Actual)	3.04	33.84
	X	NA	NA	3.28	NA
	W	16	18 (Estimate)	3.24	58.32 (Estimate)
	Z	NA	NA	3.24	NA

UNIT 2	CAPSULE	CYCLE	CUMULATIVE IRRADIATION TIME (EFPY)	LEAD FACTOR	EFFECTIVE EXPOSURE (YR)
	V	1	0.87 (Actual)	3.09	2.69
	Y	5	5.13 (Actual)	3.11	15.95
	U	9	10.31 (Actual)	3.20	30.93
	X	NA	NA	3.22	NA
	W	15	18 (Estimate)	3.19	57.42 (Estimate)
Z	NA	NA	3.19	NA	

SURVEILLANCE CAPSULE LOCATIONS IN REACTOR PRESSURE VESSEL



STPEGS UFSAR

TABLE 16.1-2

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM –
 WITHDRAWAL SCHEDULE

Unit 1

<u>CAPSULE NUMBER</u>	<u>VESSEL LOCATION (degrees)</u>	<u>LEAD FACTOR (Capsule)</u>	<u>ACTUAL/RECOMMENDED WITHDRAWAL TIME (EFPY)</u>
U	58.5°	3.59 ⁽¹⁾	0.78 (Removed) ⁽⁴⁾
Y	241.0°	3.28 ⁽¹⁾	4.9 (Removed) ⁽⁴⁾
V	61.0°	3.04 ⁽²⁾	11.13 (Removed) ⁽⁴⁾
X	238.5°	3.28 ⁽³⁾	N/A
W	121.5°	3.24 ⁽³⁾	18 ⁽⁵⁾
Z	301.5°	3.24 ⁽³⁾	N/A

Unit 2

<u>CAPSULE NUMBER</u>	<u>VESSEL LOCATION (degrees)</u>	<u>LEAD FACTOR (Capsule)</u>	<u>ACTUAL/RECOMMENDED WITHDRAWAL TIME (EFPY)</u>
V	61.0°	3.09 ⁽¹⁾	0.87 (Removed) ⁽⁴⁾
Y	241.0°	3.11 ⁽¹⁾	5.13 (Removed) ⁽⁴⁾
U	58.5°	3.20 ⁽²⁾	10.31 (Removed) ⁽⁴⁾
X	238.5°	3.22 ⁽³⁾	N/A
W	121.5°	3.19 ⁽³⁾	18 ⁽⁵⁾
Z	301.5°	3.19 ⁽³⁾	N/A

1. Lead factor derived from reanalysis of sensor sets from previously withdrawn capsules
2. Lead factor calculated based on actual end of cycle fluence
3. Lead factor based on cycle specific exposure calculations for current fluence
4. Actual Effective Full Power Years (EFPY) at removal
5. Recommended removal time in EFPY. These values are approximate and are selected to ensure that exposure is not excessive.