

Multi-National Design Evaluation Programme (MDEP)
AP1000 Working Group

**Design-Specific Technical Report
TR-AP1000WG-05**

**Technical Report on Lessons Learnt from
Implementation of the Common Position
on FPOT for AP1000**

Participation

Regulators involved in the MDEP working group discussions:	NNSA (China), AERB (India), NRC (U.S.)
Regulators which support the present technical report:	NNSA (China), AERB (India), NRC (U.S.)
Regulators with no objection:	None
Regulators which disagree:	None

1. Introduction and Background

This technical report evaluates the implementation of the Multinational Design Evaluation Group (MDEP) Common Position (CP) Addressing First-Plant-Only-Tests (FPOT), Version 1, dated April 2018, CP-STC-01 (Reference 1), in the crediting of FPOT and First-Three Plant Only Tests (F3POT) for the AP1000 design. As described in the CP, an FPOT, if accepted by the applicant/licensee's and regulators, will allow a test performed on the first reactor of a specific design to be credited for the subsequent units of similar design. An F3POT is similar to an FPOT except that the test must be performed at three reactors before it can be credited at a subsequent reactor. The CP identifies appropriate preconditions which, if met, should allow a test at one reactor to be credited at another reactor. This report describes how each of the preconditions was considered in crediting FPOTs and F3POTs in implementing the AP1000 design across multiple reactors.

At the time of this writing, the AP1000 design has been constructed in China at Sanmen Units 1 and 2 and Haiyang Units 1 and 2 and is currently being constructed in the US at the Vogtle Electric Generating Plant (VEGP) Units 3 and 4. The AP1000 design constructed at these sites identifies seven FPOTs and two F3POTs to be conducted as part of plant commissioning in the initial test program. These tests are described in Sections 14.2.9 and 14.2.10 of the AP1000 Design Certification Document (Reference 2).

These nine tests were all successfully implemented at Sanmen Unit 1, and the two F3POT were also successfully implemented at Sanmen Unit 2 and Haiyang Unit 1. Although the VEGP licensee initially intended to conduct the tests, late in the process the licensee requested approval from the United States Nuclear Regulatory Commission (USNRC) to credit the tests conducted in China for the VEGP AP1000s. After reviewing the four requests covering the seven FPOTs and two F3POTs, the USNRC staff approved changes to the VEGP licenses that credited the tests performed at the AP1000 reactors in China. Table 1 summarizes the requests.

Table 1. Requests to Credit Sanmen and Haiyang FPOTs and F3POTs at the VEGP Units 3 and 4

VEGP Request	Tests Covered	FPOT or F3POT	Test Type	USNRC Approval
August 3, 2018 (ML18215A384, Reference 3)	IRWST Heatup	FPOT	Pre-Op	January 22, 2019 (ML18351A351, Reference 4)
	RVI Vibration	FPOT	Pre-Op	
	CMT Heated Recirculation	F3POT	Pre-Op	
April 26, 2019 (ML19119A249, Reference 5)	ADS Blowdown	F3POT	Pre-Op	October 22, 2019 (ML19262F859, Reference 6)
June 28, 2019 (ML19179A209, Reference 7)	PRHR Natural Circulation	FPOT	Low Power	December 10, 2019 (ML19322C321, Reference 8)
	Steam Generator Natural Circulation	FPOT	Low Power	
	Rod Cluster Control Assembly Out-of-Bank Measurements	FPOT	Power Ascension	
	Load Follow Demonstration	FPOT	Power Ascension	
July 26, 2019 and November 1, 2019 (ML19207A727, Reference 9, and ML19305D559, Reference 10, respectively)	Pressurizer Surge Line Stratification Evaluation	FPOT	Pre-Op	January 2, 2020 (ML19339H316, Reference 11)

2. Evaluation of How CP Preconditions Were Met in Crediting FPOTs/F3POTs for US licensee

CP-STC-01, Revision 1 (Reference 1), identifies preconditions that, when fulfilled, provide for tests performed on one nuclear plant to be credited to another plant. The obvious precondition for crediting FPOT results is that the design, implementation, and plant conditions are so similar that the possible existing differences do not affect the applicability of the results to the unit where the test will not be performed. Reference 1 also identifies 21 preconditions organized into 5 categories:

- Licensee responsibilities (2),
- Justification and demonstration of the validity of the FPOT (9),
- Data sharing (3),
- Testing and testing programme (4), and
- Other (3).

This report provides an evaluation of how each of the 21 preconditions was considered in the VEGP evaluations.

Licensee's Responsibilities

1.1 The licensee shall evaluate and assess the possibility to credit tests performed on another unit.

Evaluation: The VEGP licensee included an evaluation of the crediting of the tests in each of its requests submitted to the USNRC (References 3, 5, 7, 9, and 10). Each request includes a technical evaluation discussion that describes why crediting the FPOT and F3POTs previously performed at Sanmen and Haiyang at VEGP Units 3 and 4 is acceptable. Therefore, this precondition was satisfied.

1.2 The licensee shall approve crediting the FPOT before submitting the application to regulator.

Evaluation: As noted for Precondition 1.1, discussed above, the VEGP licensee evaluated whether crediting the Sanmen and Haiyang FPOT/F3POTs was acceptable in its requests submitted to the USNRC. These evaluations concluded that the previously completed tests and test results accomplished their purpose and are applicable to VEGP Units 3 and 4. Therefore, this precondition was satisfied.

Justification and Demonstration of the Validity of the FPOT

2.1 The reasons for conducting a FPOT (cost, time, technique, safety) shall be defined, and a cost benefit analysis for conducting a FPOT shall be made.

Evaluation: The reason for conducting the FPOTs and F3POTs for the AP1000 design is identified in the AP1000 Design Certification Document incorporated by reference into the VEGP licensee's final safety analysis report (FSAR), Section 14.2.5, which describes the tests as "[s]pecial tests to further establish a unique phenomenological performance parameter of the AP1000 design features beyond testing performed for Design Certification of the AP600 and that will not change from plant to plant...." UFSAR Section 14.2.5 also provides the basis that "[b]ecause of the standardization of the AP1000 design, these special tests (designated as first plant only tests) are not required on follow plants." This information confirms that the aspect of this precondition involving the reasons for conducting the FPOTs is satisfied. Regarding making a cost-benefit analysis for conducting an FPOT, the applicable US regulations do not require a cost benefit analysis for the FPOTs and F3POTs and, therefore, the US regulator did not require a cost benefit analysis. In general, to determine whether a test should be conducted, a licensee would consider the costs and benefits of each alternative, such as whether the licensee's request to omit the test would be approved by the regulator, the financial and schedule advantages, the usefulness of test data, and the risks of performing and not performing the test. Therefore, this precondition was partially satisfied.

2.2 Similarity of the unit on which the test was conducted and the one which will credit the FPOT shall be assessed. It shall be demonstrated that possible differences in design, manufacture and

installation of the FPOT component or system, in the environmental and operating conditions and practices, or the codes and standards applied, do not affect the validity of the FPOT results to other unit(s).

Evaluation: The similarity of VEGP Units 3 and 4 and Sanmen Unit 1 (for FPOTs)—and Sanmen Units 1 and 2 and Haiyang Unit 1 (for F3POTs)—was assessed by the VEGP licensee. As discussed in References 3, 5, 7, 9, and 10, the VEGP units and Sanmen and Haiyang units are based on the same AP1000 design and, for each specific FPOT and F3POT, the VEGP licensee assessed site-specific as-built design changes in its evaluation of whether the corresponding Sanmen and Haiyang tests should be credited toward the VEGP units (for example, see Reference 3, Enclosure 2, pages 11, 19, and 28, and similar discussions in References 5, 7, 9, and 10). Therefore, this precondition was satisfied.

2.3 A statement shall be made (e.g. by vendor or by operating organization) on any potential adverse consequences of claiming that the FPOT characterises the performance or behaviour of a component or system whose design, manufacture or installation do not adequately replicate that for the component or system subjected to the FPOT.

Evaluation: For the VEGP, Sanmen, and Haiyang units, the components and systems involved in the FPOTs and F3POTs were adequately replicated across the units. As a result, the issue of potential adverse consequences arising from differences between the units was not a concern. The VEGP operating organization verified that the constructed plants were in accordance with the design and that the equipment involved was the same in their LAR and made the argument that the FPOTs and F3POTs were not required to be completed at the VEGP units. Therefore, this precondition was satisfied.

2.4 In designing the test, it should be considered whether the data could be used to design and validate a less complex or alternative test that may be used during commissioning of follow-on units to characterise the performance or behaviour of the component or system and thus help validate application of the FPOT data.

Evaluation: For the VEGP, Sanmen, and Haiyang units, the components and systems involved in the FPOTs and F3POTs were adequately replicated across the units. As a result, the issue of potential adverse consequences arising from differences between the units was not a concern and the VEGP licensee elected to not do the tests claiming the outcome of the tests conducted at the Chinese units applied to the VEGP units rather than identifying replacement tests. Therefore, this precondition did not apply in the case of the US and Chinese AP1000 units.

2.5 Where FPOT data is demonstrating the ability of a component or system to fulfill a critical nuclear safety function, for example primary circuit integrity/inventory or reactivity control, an independent third-party panel of experts shall be appointed by each licensee to oversee all aspects of the FPOT. Consideration could be given to licensees jointly appointing such a panel. The terms of reference of such a panel shall include the production of a report recording its judgement on the validity of applying the resulting data to follow on units including in another country. This report is to record any caveats or conditions which, in the view of the panel, may constrain or exclude application of the data. Test results from the first unit must be reliable to the extent that any subsequent test would be expected to produce similar results.

Evaluation: Applicable regulations did not require the VEGP licensee to appoint a third-party of experts to oversee the FPOTs and F3POTs and prepare a report to judge the validity of applying the data from the Sanmen and Haiyang units to the VEGP units. Further, the decision of the VEGP licensee to take credit for the testing on the AP1000 units in China was not considered until after the testing had been completed. As such, the VEGP licenses did not have the opportunity to consider arranging a panel and did not provide an independently commissioned report to the USNRC to support the US regulator's assessment. Therefore, this precondition was not satisfied.

- 2.6 It is necessary for the licensees to ensure the adequacy of the quality assurance programme of tests for the FPOT unit, considering the quality assurance requirements of the unit where FPOT may be credited. This includes ensuring the adequacy of the quality assurance programme for instrument calibration.

Evaluation: The VEGP licensee described the adequacy of the quality assurance (QA) programs of the Sanmen and Haiyang units in its request to the USNRC to credit the Sanmen and Haiyang FPOTs and F3POTs (See References 3, 5, and 7). The VEGP licensee concluded, "Based on the review of the QA regulations, the [FPOTs and F3POTs] were conducted following QA standards that encompass the 10 CFR Part 50 Appendix B requirements applied at [VEGP]." The USNRC "... determined ... that QA program controls for the [FPOT and F3POT] used were consistent with 10 CFR Part 50, Appendix B." Therefore, this precondition was satisfied.

- 2.7 Any physical verification(s) that have been or will be performed to demonstrate the validity of FPOT shall be identified.

Evaluation: The VEGP licensee reviewed the outcome of the tests and compared the actual built plants. Because the tests were designed to further establish a unique phenomenological performance parameter of the AP1000 design features beyond testing completed earlier in the process, once the tests validated the base design, no further physical verification was needed. This precondition did not apply.

- 2.8 All the test critical parameters, calculations and verification methods used during the initial test programme shall be identified. For calculated values, this includes the calculated validation methodology, software verification and validation (when applicable), and the actual data inputs and outputs from the initial test results to support calculated values.

Evaluation: Critical parameters, calculations, and verification methods used in the initial test programme FPOTs and F3POTs are identified and discussed in the VEGP applications and in USNRC's safety evaluations of the VEGP requests to credit FPOTs and F3POTs conducted in Sanmen and Haiyang. (See Reference 4, Sections 3.1.2, 3.1.3, and 3.1.4; Reference 6, Section 3.0; Reference 8, Sections 3.1.2, 3.1.3, and 3.1.4; and Reference 10, Section 3.0). Therefore, this precondition is satisfied.

- 2.9 The controls that vendors will have in place during the initial test programme to ensure that work performed to another language procedures or instructions are correctly translated from the original language of the procedures or instructions shall be documented.

Evaluation: As part of the review of information about FPOTs performed at Sanmen, the USNRC confirmed that test control program procedures, test specifications, and post-test analysis were prepared in English. During the initial testing at the plants in China, licensees translated all the test documents, some test specifications and post-test analysis reports into Chinese as references, but the English documents from the vendor were always considered the control documents. The vendor put controls in place to assure correct translation. After communication issues were identified, the vendor increased communications. Therefore, this precondition was satisfied.

Data Sharing

- 3.1 The licensee shall have access to all necessary data for crediting the FPOT (including information relating to design, manufacture and installation) for a period of time consistent with the licensee's obligations under country regulation.

Evaluation: The VEGP licensee had access to the necessary data for crediting the FPOTs and F3POTs conducted at the Sanmen and Haiyang plants. The VEGP licensee's submittals to the USNRC discuss this data (References 3, 5, 7, 9, and 10). Therefore, this precondition was satisfied.

3.2 Justification for crediting the FPOT, documentation concerning the testing (e.g. testing programme, result report) and quality assurance programme of the FPOT shall be submitted to the regulator.

Evaluation: Regarding the tests from Sanmen and Haiyang to be credited at VEGP, the information submitted to the USNRC that justified crediting the FPOTs is discussed in the safety evaluations prepared by the USNRC (References 4, 6, 8, and 11). Testing reports and QA program documents related to the Sanmen and Haiyang tests were made available to the USNRC for review but were not submitted. The USNRC did not find actual submittal of the documents necessary and was able to review the appropriate information without actual submittal. Therefore, the purpose of this precondition was satisfied.

3.3 It shall be possible to share other relevant data and results with the regulator as necessary (material data of equipment/structures involved in the tests, data about manufacturing and installation, quality assurance actions taken during those phases, etc.).

Evaluation: As noted above in the evaluation of Precondition 3.2, relevant data and results from the Sanmen and Haiyang FPOTs and F3POTs were made available to the USNRC. Therefore, this precondition was satisfied.

Testing and Testing Programme

4.1 Documentation of the FPOT must be included in the commissioning programme of the subsequent unit.

Evaluation: AP1000 FPOTs are described in Section 14.2 of the AP1000 Design Certification Document, Revision 19 (Reference 2), as updated in Section 14.2 of the VEGP Units 3 and 4 Final Safety Analysis Report (Reference 12). When the USNRC found crediting the FPOTs and F3POTs from another site acceptable for VEGP, the USNRC approved changes to Section 14.2 of the VEGP Units 3 and 4 FSAR that documented completion of the FPOT and that the FPOT was not required for VEGP Units 3 and 4. Therefore, this precondition did not apply.

4.2 The testing programme for the FPOT must address coverage of the testing, the acceptance criteria, prerequisites to the tests, the management of deviations and the appraisal of uncertainties.

Evaluation: As discussed in Reference 4, the VEGP licensee evaluated the FPOT results to ensure that adequate QA processes were in place to verify the validity and applicability of the data collected. This included ensuring (1) that the testing methods and conditions were properly controlled, (2) that any deviations or anomalies identified during testing were properly evaluated, (3) that the test data was evaluated for acceptability against appropriate acceptance criteria, and (4) that there were no changes to the standard AP1000 design implemented at Sanmen Unit 1 that could impact the applicability of the data collected. For the other FPOTs and F3POTs at Sanmen Units 1 and 2 and Haiyang Unit 1, the VEGP licensee provided similar information about the testing programmes (References 5, 7, 9, and 10). Therefore, this precondition was satisfied.

4.3 The licensee and the regulator shall be provided with possibility to witness the FPOT. Regulators can participate in a joint inspection with the regulator overseeing the FPOT unit. To do so, they have to be informed of the expected schedule and programme and must be informed of any changes in the schedule and programme with sufficient time.

Evaluation: The VEGP licensee did not decide to try to take credit for the tests until the pre-operational tests were already completed, so neither the VEGP licensee nor the USNRC were provided with an opportunity to witness all the tests. However, the VEGP licensee was provided an opportunity to witness a few of the FPOTs and F3POTs performed at Sanmen Units 1 and 2 during low power operation and power ascension. For example, in Reference 3, page 7 of 38 of Enclosure 2 states:

In addition to reviewing test documentation and results, SNC [Southern Nuclear Company] performed observations of preoperational testing at Sanmen Unit 2. Two SNC individuals, with backgrounds in engineering and operations, were on site at Sanmen Unit 2 to perform observations of the pre-operational testing including the CMT recirculation first three plant test. The objective of the visit was to observe the following activities for those specific tests:

- performance of pre-test requirements,
- confirmation of M&TE usage,
- adherence to the approved procedure,
- execution of test changes,
- handling of anomalies, problems, and/or interruptions,
- handling of deficiencies,
- recording of data,
- maintenance of the test narrative log, and
- maintenance of operator logs.

The observations were documented in a report. The report chronicles the daily observations and access the individuals had throughout their time on site. The observations concluded the first three plant test at Sanmen Unit 2 was conducted in accordance with the test procedures.

Similar discussions of test observations are described in References 5 and 7 (for observations of testing at Sanmen Units 2 and 1, respectively). Additionally, inspectors of the US regulator were present at the Sanmen site and observed several of the FPOTs. Therefore, this precondition was partially satisfied.

4.4 Tests that demonstrate the correctness of manufacturing and installation must always be performed on the equipment/unit in question.

Evaluation: In the case of the nine specific AP1000 FPOTs and F3POTs, all tests were intended to establish a unique phenomenological performance parameter of the AP1000 design rather than to demonstrate correctness of manufacturing and installation. Therefore, this criterion does not apply. Nevertheless, the AP1000 FPOTs and F3POTs were performed on the actual installed systems at the Sanmen Units 1 and 2 and Haiyang Unit 1, and the VEGP licensee found that the installation at Sanmen and Haiyang was the same as that constructed at VEGP and similar equipment was used. For the first six AP1000 units, much of the equipment was procured by the vendor.

Other

5.1 Following completion of the FPOT, the vendor shall make a statement on the appropriateness to not repeat the test on future units, including discussion on the significance of the test results, any unexpected behaviour (notwithstanding that the acceptance criteria may have been met) and any implications for the safety case/operation of the plant (normal and/or abnormal conditions).

Evaluation: For AP1000 FPOTs, the USNRC did not require or consider any statement from the vendor about the appropriateness to not repeat the test on future units. Further, the vendor did not make such a statement. Therefore, this precondition was not satisfied.

5.2 Like any other commissioning test, it must be ensured that the FPOT provides adequate basic data on the operational properties of structures, systems and equipment for use as a basis for assessing the results of periodic testing during operation and for the assessment of changes in the operability of components.

Evaluation: For the AP1000 design, the FPOTs and F3POTs are special tests to further establish a unique phenomenological performance parameter of the AP1000 design features beyond testing

performed for Design Certification of the AP600 and that will not change from plant to plant, are performed for the first plant only or on the first 3 plants only. Because of the standardization of the AP1000 design and the fact that the tests showed that the design would work, these special tests are not required on follow plants and the results were not needed as a basis for assessing the results of periodic testing during operation or for the assessment of changes in the operability of components. The basic data about the operational properties of structures, systems, and equipment that are provided by AP1000 FPOTs are described in Section 14.2 of the AP1000 Design Certification Document, Revision 19 (Reference 2), as updated in Section 14.2 of the VEGP Units 3 and 4 Final Safety Analysis Report (Reference 12). For example, FSAR Section 14.2.9.1.3 provides information about the prerequisites, general test method, and acceptance criteria of the IRWST Heatup FPOT. Therefore, this precondition did not apply.

5.3 Educational aspects must be considered. Consideration should be given to the loss of the opportunity provided by conducting the FPOT for operators to gain experience and familiarity with the component or system.

Evaluation: Loss of the opportunity for operators to gain experience and familiarity with the components and systems involved in the FPOTs and F3POTs is not required under US regulations and was not considered by the USNRC. Operators gain enough experience and familiarity with the components and systems through their required training and qualification, and through implementation of other system testing—besides the FPOTs and F3POTs—performed during commissioning. Therefore, this precondition was not satisfied.

3. Additional Preconditions Considered (if any)

This evaluation of how AP1000 FPOTs and F3POTs performed at Sanmen Units 1 and 2 and Haiyang Unit 1 were credited in the licensing of the VEGP plants did not identify additional criteria to be included in a future revision of CP-STC-01.

4. Lessons Learnt

This evaluation of how AP1000 FPOTs and F3POTs performed at Sanmen Units 1 and 2 and Haiyang Unit 1 were credited in the licensing of the VEGP plants found that for the most part the preconditions identified in the CP were appropriate to support the US regulator's decision to credit the FPOTs at the VEGP plants. As described in Section 2, some, but not all, of the preconditions identified in CP-STC-01 were satisfied in the US experience for the AP1000 design. For the preconditions not satisfied, satisfying them was not necessary in order to meet the applicable regulations and to assure safe construction and operation of the licensee's plants. CP-STC-01, Revision 1, remains adequate for evaluating whether an FPOT (or F3POT) from one plant may be credited to another plant.

Preconditions that were clearly satisfied included 1.1, 1.2, 2.2, 2.3, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 4.2, and 4.4. Preconditions partially satisfied included 2.1 and 4.3. Preconditions that did not apply included 2.4, 2.7, 4.1, 4.4 and 5.2. Preconditions that were not satisfied included 2.5, 5.1, and 5.3.

5. Recommendations

CP-STC-01, Revision 1, should continue to be considered as a guide for evaluating whether an FPOT (or F3POT) from one plant may be credited to another plant, but should be adjusted based on the lessons learnt.

Additional experience in applying CP-STC-01 for other plant designs should be considered in a future update of the common position.

Preconditions 1.1, 1.2, 2.2, 2.6, 2.9, and 3.2 were found to be required. The only adjustment that could be considered is the use of the word "shall" since this is not a regulation – it is guidance. Preconditions 3.1 and 3.3 were found to be required, but rewording could help to better define the need. For

Precondition 3.1, consider augmenting the statement to say that the licensee needed to possess the data and in Precondition 3.3, augment to reflect that the regulator does not need to possess the data, only the ability to verify the data.

The working group members felt that Preconditions 2.1 and 4.3 could be addressed by removing the “shall.” Depending on the needs of the licensee and regulator and when the FPOTs occur, the cost benefit analysis may not be needed (it always costs less not to do the test) and setting up a panel may not be an option. Precondition 4.3 may not apply in some cases. For AP1000, FPOTs were not developed to characterize the performance of a component or system. Ideally, if this was what the FPOT was set up to test, it should not be considered an FPOT, but the working group recognizes that depends on the design and processes developed by the vendor. Wording should be modified to reflect this possibility.

For Precondition 2.3, for AP1000 this was indicated as being met because the licensee verified the systems were the same when applying to credit the FPOTs. However, the wording of the precondition is confusing and should be reconsidered to ensure that all understand the intent of the precondition.

For Precondition 2.4, for AP1000, tests were not designated FPOTs if the data was needed for proceeding with operations or to find the system acceptable. The precondition should be revisited to verify that it is valid for other designs. It does not apply to AP1000.

Precondition 2.5 should be revisited or reworded in that it calls for an independent panel made up of representatives from all the licensees. The US Regulations do not call for this and the vendor and licensee for AP1000 did not put such a panel in place. Further, later licensees might not have the opportunity to participate. It could be valuable in making the decision, but unless there are requirements calling for it besides this guidance, it should be worded as an option, not a requirement.

Precondition 2.7 looks to have any physical verifications that should be performed to demonstrate the validity of FPOT be identified. The AP1000 working group was not sure what was intended by this precondition. It should be better worded so that future regulators understand the intent. Based on our interpretation, it did not apply because the FPOTs for AP1000 were solely intended to establish unique phenomenological performance parameters of the AP1000 design features. As such, there was no need to do physical verifications.

Precondition 2.8 should be revised because it is unclear. It seems to call for the new licensee to go back and verify that the critical parameters, calculations, and verification methods were all identified and verified. For AP1000, the FPOTs were a way to establish how the new systems performed, to verify the assumptions in the design, for example. Once the vendor verified their assumptions, no further verification of the information should have been needed. However, the USNRC staff did go through and verify that the methods used made sense to credit them and allow their licensee not to complete the tests. Clarification of the words or intent could prevent confusion for future use of the CP.

Precondition 4.1 should be revised to better explain the intent. Is it intended that the licensee deciding not to do the FPOT maintain the documentation for the other unit indefinitely? Or is the intent to maintain the basis for not doing the FPOT? Because USNRC staff determined the tests did not need to be repeated, maintaining the documentation beyond the amendment paperwork was not required, so the precondition did not apply.

Precondition 4.2 calls for the testing programme to cover testing, acceptance criteria, prerequisites, etc. It is not clear from the wording of the precondition whether the CP is looking for the plant completing the test to cover it, the follow-on plant to cover it, or both the initial and follow-on plants. This should be clarified. When the USNRC staff reviewed the request not to do the tests, they looked at the test program and results for the tests done on the Chinese units. In doing so, the Working Group felt they met the pre-condition.

If the intent of Precondition 4.4 is to define FPOTs, it should be reworded. This did not apply for AP1000 because FPOTs were not tests used to verify that equipment was manufactured and installed correctly. If the test is to perform this function, per the AP1000 design, it should not be an FPOT. This could be alleviated if the precondition was reworded so that if the FPOT was not the only test that would verify that components worked as intended and were installed correctly, that it had to be performed on all units or a replacement test identified.

For Precondition 5.1, a statement from the vendor is not needed to make the determination of whether the FPOT should be completed on future units. It would be useful, but such a statement should not prevent the licensee and regulator from analyzing the need for the test. The words should be softened to remove the “shall”.

For Precondition 5.2, the words should be changed as not all FPOTs provide data on the operational properties of structures, systems and equipment for use as a basis for assessing the results of periodic testing during operation and for the assessment of changes in the operability of components. For AP1000, the information was used to verify the design. Other tests that were not designated as FPOTs provided this type of data, so this precondition did not apply.

For Precondition 5.3, educational aspects do not really need to be considered, and this precondition could be deleted. For AP1000 and other designs, the operators go through a detailed training program and are given the opportunity to work with the newly designed plant through the remainder of the initial test program, hot functional testing, and power ascension. The loss of the opportunity with the highly specialized tests will not affect much.

6. References

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