24

TEST RESULTS REPORT

PROCEDURE NO. 93HF-1MA05

PROCEDURE TITLE Main and Auxiliary Transformer Backfeed

REVISION AT THE COMMENCEMENT OF TESTING Rev. 0 DATE 10-8-82

REVISION AT COMPLETION OF TESTING Rev. 0 DATE 10-8-82

LATEST TEST CHANGE NOTICE NO. 004 DATE 7-22-83

DATES OF TEST PERFORMANCE 4-20-83 thru 5-15-83

PAGE 1 OF 5

Review and
Approval of Test Results

PREPARED BY: [signature] DATE: 7-21-83

TECHNICAL REVIEW: Thomas Olshefsky DATE: 7-21-83

GROUP SUPERVISOR REVIEW: Roy W [illegible] DATE: 7-21-83

TEST WORKING GROUP MEETING NUMBER: _____ DATE: _____

PLANT REVIEW BOARD MEETING NUMBER: _____ DATE: _____

QUALITY ASSURANCE REVIEW: _____ DATE: _____
(Required for Test Results Reports not reviewed by TWG)

STARTUP MANAGER APPROVAL: _____ DATE: _____

50-528

TEST PURPOSE

To verify through energization the integrity of the Unit #1 Main Transformer E-MAN-X01A -X01B -X01C and the Unit Auxiliary Transformer E-MAN-X02.

To provide baseline data for the Unit Auxiliary Transformer when subjected to load.

To verify proper operation of the generator 525KV breakers to include breaker OPEN/CLOSE and trip circuits.

To provide baseline data for phase angle relationship of isophase bus to 500KV yard bus.

Verification of proper operation of motor operated disconnect 525-910 and proper phase rotation of bus E-NAN-S01 and S02.

SCOPE

The scope of testing for this procedure involved the testing of the main generator breakers tripping OPEN/CLOSE circuits using either manual actuation of the protective relay devices or simulation of permissive or trip signals using momentarily installed jumpers. The motor operated disconnect switch was functioned in the de-clutched position from its hand switch located on the main control board. Indicating lights were verified to correspond to the position of the switch.

The main and unit auxiliary transformers were energized using the 525KV generator breaker 525-918. Readings were taken of voltage and phase angle at both the generator isophase bus and the 13.8KV breakers E-NAN-S01A and E-NAN-S02A to verify proper outputs. Temperature readings were recorded at specified intervals on both the unit main transformers and unit auxiliary transformers.

COMPLEMENTARY TESTS

The following pre-operational tests were necessary to be completed prior to the energizing of the main transformer:

93PE-1MA03 Unit Auxiliary Transformer
93PE-1MA04 Main Transformer
93PE-1MA02 Isophase Bus

It was necessary to have the following systems tested and in operation for the performance of 93HF-1MA05:

1FP-11 Unit Auxiliary XFMR Fire Protection
1FP-14 Main Transformer Fire Protection

Testing of the 525KV breakers was the responsibility of the Salt River Project. They were contacted by letter and phone to verify proper

operation of the 525KV breakers and they cooperated in the functional testing of the interface points between APS and SRP. No FSAR commitment has been made concerning this test.

TEST DESCRIPTION

Testing in general was performed either by actuation of the normal control element or by simulation of a control element or trip function by the use of momentary jumpers.

Testing of motor operated disconnect switch #910 was conducted using the normal control switch located in the main control room. No protective relay devices are associated with this motor operated disconnect switch.

Generator breakers 915 and 918 were functioned using the normal control switches located at the main control panel. The protective relay circuits associated with the main generator breakers were either actuated by manually turning the protective relay disk or by the use of jumpers being momentarily placed across connection points on the relay. The breakers were tripped by manually actuating lockout relay 586T2. Each breaker was actually tripped by the manual actuation of the 586T2 relay both from a primary and backup trip scheme. The proper association of test switch with lockout relay was verified by opening the test switch and attempting a trip of its associated lockout relay, verifying that the lockout relay did not trip with the test switch OPEN and then closing the test switch and verifying that the lockout relay tripped. Simulations of auxiliary contacts contained in breakers 525-915 and 525-918 were performed with jumpers at the specific breakers to provide actuation of relays 552X-1 (552X-2).

Manual actuation of relay 552X-3 verified a circuit exists between relay 552X-3 and the generator distance backup relay and also that a permissive signal has been transmitted to the TSI cabinet.

Energization of the Unit #1 main transformer via breaker 525-918 furnished a baseline data source which provided unload temperature data on each main transformer and a phase angle relationship between the primary of the main transformer and the 500KV yard bus. Also, the voltage output of the main transformer was recorded on the isophase bus at the main generator potential cabinets.

Energization of the Unit #1 main transformer and the unit auxiliary transformer E-MAN-X02 provided a record of baseline data temperatures for both the main transformer, with a secondary load, and the unit auxiliary transformer unloaded. Energization of the unit auxiliary transformer provided a method to verify the phase angle relationship between the secondary of the unit auxiliary transformer and the 13.8KV buses E-MAN-S01 and E-NAN-S02.

TEST EVENTS

Testing on procedure 93HF-1MA05 started on April 20, 1983 and was completed on May 15, 1983.

The testing required to arrive at a point where the main and auxiliary transformers could be energized required a time period of approximately seven (7) days.

On 4-27-83 we attempted to close motor operated disconnect MOD 910 using the hand switch located in the main control room. This attempt was not successful. It was determined that a misalignment was present in the limit switches at MOD 910. A manual realignment was accomplished using the hand crank furnished with the MOD and the switch was then able to be closed from the main control room.

The Unit #1 main transformer E-MAN-X01A -X01B -X01C was energized via 525-918 on 4-27-83 at 1823 hrs. At approximately 1825 hrs. main generator breaker 525-918 tripped. Upon investigation, it was determined that the Salt River Project relay technicians involved with the 525KV yard relay testing had inadvertently removed a relay test plug from the 525KV bus differential relay which caused breaker 525-918 to trip. This problem was corrected and approval was received from system operations and control (SOC) to reclose breaker 525-918, which was accomplished at 1856 hrs.

No further problems were encountered during the backfeed of the Unit #1 main transformer and the transformer was de-energized after a period of five hours.

On 5-11-83 at 1620 hrs. breaker 525-918 was closed and the unit main transformer E-MAN-X01A -X01B -X01C with the unit auxiliary transformer E-MAN-X02 were energized. No problems were encountered during the eight (8) hour log period. The backfeed configuration was maintained for five days due to operational requirements during hot functional testing. No problems were noted during the five (5) days that the backfeed configuration was energized.

The problems encountered with the motor operated disconnect 910 were reported to Salt River Project and will be corrected as soon as possible.

TEST RESULTS

The test results obtained satisfy the values required by the acceptance criteria.

The only problem encountered during the testing was that encountered with the motor operated disconnect MOD 910. These problems have been documented to Salt River Project by letter dated May 23, 1983 and will be worked when conditions allow.

CONCLUSIONS

The test data derived from procedure 93HF-1MA05 proved that the system equipment involved in this test will function according to the station design criteria. The following conclusions were derived from the test data obtained:

The control and breaker trip functions for the main generator breakers performed properly.

The main transformer and auxiliary transformers running temperatures did not exceed the factory suggested limits.

The voltage limits and phase angle relationships supplied by the unit main and auxiliary transformers was within acceptable limits.

The protective relay circuits and associated equipment for protection of the main generator, main transformers, and auxiliary transformers performed according to the logic on the implementing references.

RECOMMENDATIONS

No additional testing was found to be required.

The following changes in test techniques are suggested to be incorporated to simplify data taking and to limit unnecessary and repetitive readings:

The readings taken on the generator isophase bus and the 500KV switch yard could be limited to one reading when first energized and another just prior to de-energizing.

The temperature readings taken on both the main transformers and the unit auxiliary transformers could be taken at one half hour intervals rather than the fifteen minute intervals stated in the existing procedure.

It is suggested that the test results be accepted and that the procedure be approved as submitted.