Ohmics

AI ELECTRICAL REVIEW

AUTOMATED PRELIMINARY SCREENING

AI Arc Flash Study Review

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Prepared for	[REDACTED]
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Job ID	SAMPLE-AF-01
Order ID	SAMPLE: anonymized production test run
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AT A GLANCE: 26 FINDINGS

5	16	4	1
CRITICAL	SIGNIFICANT	OBSERVATION	INFORMATION

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EXECUTIVE SUMMARY

Findings and Recommendations Summary

This review found 26 findings: 5 critical, 16 significant, 4 observations and 1 information item. The critical findings concern electrode configuration, geometry, clearing time and source data. The recommendations below cover every critical and significant finding. Full detail begins on the following page.

SEVERITY DISTRIBUTION



Critical 5 Significant 16 Observation 4 Information 1

RECOMMENDATIONS

Finding 1 · Critical
1. Assign electrode configuration per bus from the actual equipment and re-run.

Finding 2 · Critical
2. Collect actual enclosure dimensions for the switchgear, transfer switch, UPS, STS and PDU classes and re-run those buses.

Finding 3 · Critical
3. Document the egress basis for each capped bus, or report the uncapped clearing time.

Finding 4 · Critical
4. Obtain a dated utility fault current letter and evaluate a minimum source case.

Finding 5 · Critical
5. State whether battery and DC equipment are in scope and, if excluded, why.

Finding 6 · Significant
6. Confirm the gap per equipment class and re-run the affected buses.

Finding 7 · Significant
7. Assign working distance per equipment class and re-run.

Finding 8 · Significant
8. Confirm whether the software device library already includes mechanism time. If it does not, add it.

Finding 9 · Significant
9. Record the utility contribution, its source and the date obtained.

Finding 10 · Significant
10. Report both cases per bus, or state that the higher value is tabulated and explain the note codes.

Finding 11 · Significant
11. Add a hazard-elimination discussion for these two buses, covering each candidate control and why it was or was not pursued.

Finding 12 · Significant
12. Evaluate whether an energy-reducing method is available on the breakers at the affected locations.

Finding 13 · Significant
13. State one governing calculation basis.

Finding 14 · Significant
14. Add a revision block identifying the study it supersedes.

Finding 15 · Significant

15. Cite the one-line by number and revision.

Finding 16 · Significant

16. State the review interval and the date the next review is due.

Finding 17 · Significant

17. Identify the affected buses in the body and state how they were treated.

Finding 18 · Significant

18. Evaluate the configurations each bus can be worked in, or list the excluded ones and why.

Finding 19 · Significant

19. Tag every device with an assumed rating and limit the adequacy conclusion to verified devices.

Finding 20 · Significant

20. Obtain the generator nameplate reactance data and compare it to the defaults.

Finding 26 · Significant

21. Record the full trip characteristic or the manufacturer curve reference for every device that carries a result.

BY CATEGORY

Electrode configuration	1	Geometry	3
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Applicability	2	Arcing current	1
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AI Arc Flash Study Review

Job SAMPLE-AF-01 · Order SAMPLE: anonymized production test run · Automated release

Anonymized sample. Client, site, people, dates, document numbers, equipment tags, part numbers and manufacturer names are removed or generalized, and identifying values are slightly modified. Findings are shortened; the engineering point of each is unchanged.

Read before relying on anything below.

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Submission details

Report	AI Arc Flash Study Review — Report AF-01
Submittal reviewed	[arc flash study].pdf (50 pages)
Client identity	Anonymized for public release

CRITICAL (5)

AF-ELEC-03-1 · Electrode configuration · issue

Critical

1. One electrode configuration used for every bus

All of the roughly 90 rows in the incident energy report use the VCB electrode configuration. The facility includes 480 V switchboards, transfer switches, generator breakers, UPS modules, static transfer switches, PDUs and 208 V panelboards, which do not share one electrode arrangement. The uniform value is likely an unrevised software default.

RECOMMENDATION
Assign electrode configuration per bus from the actual equipment and re-run.

Source: page 42, pp. 42–44, Appendix F Incident Energy Report, Electrode Config column

Code ref: none (general observation)

Confidence: high

AF-GEOM-01-2 · Geometry · issue

Critical

2. One enclosure size used for every bus

Every row uses a 12 × 14 × 10 in enclosure, including the two service transfer switch breakers (19.64 kA bolted, 70.97 cal/cm²; and 69.42 cal/cm²) and the UPS and static transfer switch equipment. That size does not describe service switchgear or a UPS lineup, and enclosure size is a calculation input under the stated 2018 model.

RECOMMENDATION
Collect actual enclosure dimensions for the switchgear, transfer switch, UPS, STS and PDU classes and re-run those buses.

Source: page 42, pp. 42–44, Appendix F, Box Width / Height / Depth columns

Code ref: none (general observation)

Confidence: high

AF-TIME-03-5 · Clearing time · issue

Critical

3. 2-second arc duration cap on about 35 buses, no basis given

About 35 rows are capped at a 2.0 s arc duration, including the two highest-energy buses and the PDU chain. The cap assumes a worker can move away within 2 seconds, and the study does not evaluate egress at any work position.

RECOMMENDATION
Document the egress basis for each capped bus, or report the uncapped clearing time.

Source: page 42, pp. 42–44, Appendix F, Trip/Delay Time column and note N9

Code ref: none (general observation)

Confidence: high

AF-SRC-03-7 · Source data · issue

Critical

4. Only an infinite utility source modeled

The study assumes an infinite utility source at the 480 V, 1,000 kVA service transformer. That is the maximum fault current case. A minimum source case can lengthen clearing times and produce higher incident energy, and it was not evaluated.

RECOMMENDATION
Obtain a dated utility fault current letter and evaluate a minimum source case.

Source: page 2, p. 2 (Method); p. 6, Appendix A one-line

Code ref: none (general observation)

Confidence: high

AF-RANGE-04-9 · Applicability · issue

Critical

5. UPS DC systems not addressed

Two UPS systems appear in the results on the AC side only. No DC bus appears and no statement excludes DC equipment or names a method for it, so it is unknown whether the DC side was evaluated, excluded or missed.

RECOMMENDATION

State whether battery and DC equipment are in scope and, if excluded, why.

Source: page 42, pp. 42–44, Appendix F; p. 5 (Arc Flash Study Summary) · Code ref: none (general observation)

Confidence: medium

SIGNIFICANT (15)

AF-GEOM-02-3 · Geometry · issue

Significant

6. One 25 mm gap used for 480 V and 208 V equipment

Every row uses a 25 mm conductor gap across 208 V and 480 V buses and across panelboards, switchboards and transfer switches. One gap for mixed voltage classes and equipment types is consistent with a default value rather than a modeled one.

RECOMMENDATION

Confirm the gap per equipment class and re-run the affected buses.

Source: page 42, pp. 42–44, Appendix F, Gap column · Code ref: none (general observation) · Confidence: high

AF-GEOM-04-4 · Geometry · issue

Significant

7. 18 in working distance used for all equipment

Every row uses an 18 in working distance, including the 480 V service equipment at 70.97 and 69.42 cal/cm². Switchgear and a 208 V branch panel are not normally worked from the same distance, and the shorter distance changes the switchgear results.

RECOMMENDATION

Assign working distance per equipment class and re-run.

Source: page 42, pp. 42–44, Appendix F, Working Distance column · Code ref: none (general observation) · Confidence: high

AF-TIME-06-6 · Clearing time · issue

Significant

8. Breaker opening time recorded as zero for every device

Breaker opening time is 0.000 s on every row, including rows protected by electronic-trip molded-case and power circuit breakers. Total clearing time is trip time plus mechanism opening time, so a uniform zero suggests mechanism time was not added.

RECOMMENDATION

Confirm whether the software device library already includes mechanism time. If it does not, add it.

Source: page 42, pp. 42–44, Appendix F; pp. 27–29, Appendix D · Code ref: none (general observation) · Confidence: high

AF-SRC-01-8 · Source data · issue

Significant

9. Utility fault current source and date not stated

The study gives no utility contribution value, no issuing utility and no date for utility data. The infinite-bus assumption takes the place of utility data.

RECOMMENDATION

Record the utility contribution, its source and the date obtained.

Source: page 2, p. 2 (Method); p. 4 (Assumptions and Clarifications) | Code ref: none (general observation)

Confidence: high

AF-IARC-02-10 · Arcing current · issue

Significant

10. Governing arcing current case not shown per bus

The reduced arcing current case was run and a note code marks where it governed. The table reports one incident energy per bus and the note is explained only in a table footer, so a reader cannot see both results or confirm which one was used.

RECOMMENDATION

Report both cases per bus, or state that the higher value is tabulated and explain the note codes.

Source: page 42, pp. 42–44, Appendix F, Notes column and note legend | Code ref: none (general observation)

Confidence: high

AF-RES-04-11 · Results · issue

Significant

11. Two buses above 40 cal/cm² treated as a labeling issue only

The two service transfer switch breakers are at 70.97 and 69.42 cal/cm². The study states no safe PPE exists, assigns DANGER labels and calls the condition common, but it evaluates no engineering control such as arc energy reduction, remote operation or relocating the main device.

RECOMMENDATION

Add a hazard-elimination discussion for these two buses, covering each candidate control and why it was or was not pursued.

Source: page 1, p. 1 (Executive Summary); p. 5 (Equipment Exceeding 40 cal/cm²) | Code ref: none (general observation)

Confidence: high

AF-TIME-05-12 · Clearing time · issue

Significant

12. No arc energy reduction evaluated where clearing time governs

The two highest results come from the 2-second cap at the upstream devices. The study does not evaluate a maintenance setting, zone interlocking or similar method, and its settings review concludes that no changes are recommended.

RECOMMENDATION

Evaluate whether an energy-reducing method is available on the breakers at the affected locations.

Source: page 4, p. 4 (TCC Curve Review Recommendations); pp. 27–29, Appendix D; p. 42, Appendix F

Code ref: none (general observation) | Confidence: high

AF-MODEL-02-14 · Model and edition · issue

Significant

13. Two standards cited as the basis without reconciling them

The method section cites the 2018 edition of IEEE 1584 "based on" an NFPA 70E annex. The 2018 model inputs are present, which supports the 2018 claim, but the study does not explain the second reference.

RECOMMENDATION

State one governing calculation basis.

Source: page 2, p. 2 (Method) · Code ref: none (general observation) · Confidence: medium

AF-MODEL-04-15 · Model and edition · issue

Significant

14. No revision number

The study has a date, a preparer and a licensed responsible engineer, but no revision identifier. It supersedes an earlier study by the same preparer, so revision control matters.

RECOMMENDATION

Add a revision block identifying the study it supersedes.

Source: page not applicable, cover page; certification page · Code ref: none (general observation) · Confidence: high

AF-DOC-02-16 · Documentation · issue

Significant

15. One-line referenced by date only

The study cites record one-line documents by date only. No drawing number, sheet or revision identifies which one-line the model was built from.

RECOMMENDATION

Cite the one-line by number and revision.

Source: page 2, p. 2 (Method) · Code ref: none (general observation) · Confidence: high

AF-DOC-03-17 · Documentation · issue

Significant

16. No review interval stated

The study states no review interval and no re-evaluation trigger, although it warns that settings changes affect the results.

RECOMMENDATION

State the review interval and the date the next review is due.

Source: page 2, pp. 2–5, Method, Assumptions and Simulation Results sections · Code ref: none (general observation) · Confidence: high

AF-RANGE-02-18 · Applicability · issue

Significant

17. Low fault current buses not called out in the report body

Four buses have bolted fault currents of 1.77 kA and 2.03 kA at 0.21 kV, and 3.09 kA and 3.44 kA at 0.208 kV. They carry a table note that a sustained arc is less likely. The note appears only in the table footer, and the body does not say how these buses were treated for labeling.

RECOMMENDATION

Identify the affected buses in the body and state how they were treated.

Source: page 43, pp. 43–44, Appendix F rows carrying note N15c; note legend p. 44 · Code ref: none (general observation) · Confidence: medium

AF-SRC-04-21 · Source data · issue

Significant

18. Only one alternate configuration evaluated

The study evaluates normal operation and one generator scenario. The facility has two services, two generators, multiple transfer switches, two UPS systems with bypasses and two static transfer switches, and none of the other configurations is evaluated or listed as excluded.

RECOMMENDATION

Evaluate the configurations each bus can be worked in, or list the excluded ones and why.

Source: page 4, p. 4 (Simulation Results); Appendix A one-lines | Code ref: none (general observation) | Confidence: high

AF-RES-05-22 · Results · issue

Significant

19. Equipment rating conclusion partly rests on assumed ratings

The summary states all equipment is properly rated. The assumptions section says panels without breaker data were given industry-minimum ratings and that fused disconnects that could not be safely opened were assumed to have 100 kA Class R fuses. The conclusion does not separate assumed ratings from observed ones.

RECOMMENDATION

Tag every device with an assumed rating and limit the adequacy conclusion to verified devices.

Source: page 1, p. 1 (Executive Summary); p. 4 (Assumptions and Clarifications); Appendix C

Code ref: none (general observation) | Confidence: high

AF-DOC-01-23 · Documentation · issue

Significant

20. Generator data taken from software defaults

Generator characteristics are software defaults based on voltage and kVA. Subtransient reactance sets the arcing current in the generator scenario, and with it the generator-source results of 16.58 to 17.21 cal/cm².

RECOMMENDATION

Obtain the generator nameplate reactance data and compare it to the defaults.

Source: page 4, p. 4 (Assumptions and Clarifications) | Code ref: none (general observation) | Confidence: high

OBSERVATION (4)

AF-RES-01-19 · Results · issue

Observation

21. Same 208 V system entered two ways

The 208 V system appears as 0.208 kV on some rows and 0.21 kV on others, with different decimal formatting on the trip times. This suggests two data-entry passes or two model sources merged into one output.

RECOMMENDATION

Normalize the voltage entries and confirm both groups came from the same model revision.

Source: page 42, pp. 42–43, Appendix F, Bus kV and Trip/Delay Time columns | Code ref: none (general observation)

Confidence: high

AF-SRC-05-20 · Source data · issue

Observation

22. Transformer impedance tolerance not considered

Transformer impedances were provided by the owner. The study does not say whether they are nameplate or tested values, and does not mention tolerance. The one-line shows a single fixed impedance of 5.7381 %.

RECOMMENDATION

State the impedance source and whether tolerance was applied.

Source: page 4, p. 4 (Assumptions and Clarifications); p. 6, Appendix A

Code ref: none (general observation)

Confidence: high

AF-RES-03-24 · Results · issue

Observation

23. Labels could not be compared to the results

Appendix G (Arc Flash Labels) is listed and has a divider page, but contains no readable label content. This review could not confirm that every bus has a label or that label values match the table.

RECOMMENDATION

Confirm the label appendix is complete in the issued copy.

Source: page 45, p. 45, Appendix G divider

Code ref: none (general observation)

Confidence: high

AF-DOC-04-26 · Documentation · issue

Observation

24. No site survey, which limits the study

The study states that no site survey was performed and that equipment was confirmed by contractor and facility staff. The uniform geometry in findings 1 through 4 is consistent with a study that collected no equipment dimensions in the field.

RECOMMENDATION

None beyond findings 1 through 4.

Source: page 2, p. 2 (Method)

Code ref: none (general observation)

Confidence: high

INFORMATION (1)

AF-MODEL-03-25 · Model and edition · issue

Information

25. Software and version identified

The study names the software package and version used. Recorded for completeness; no deficiency.

RECOMMENDATION

None.

Source: page 2, p. 2 (Method)

Code ref: none (general observation)

Confidence: high

ITEMS TO VERIFY (1)

These findings depend on information the submittal does not include, so confidence in them is lower. Verify them against field conditions or other documents.

AF-TIME-04-13 · Clearing time · issue

Significant

26. Clearing times not traceable to settings for 14 devices

Fourteen devices, mostly panel main and feeder breakers, show their trip settings only as "Fixed", "Thermal Curve =" or blank. For these, the clearing time in Appendix F cannot be traced to a setting. The times may still be correct.

RECOMMENDATION

Record the full trip characteristic or the manufacturer curve reference for every device that carries a result.

Source: page 27, pp. 27–29, Appendix D, Overcurrent Protective Device Settings

Code ref: none (general observation)

Confidence: low