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PDS100
Metal-Clad Switchgear Case

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Application Engineer

Metal-Clad Substation

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Westinghouse Vac-Clad Switchgear, 15 kV

Westinghouse Type VCP Vacuum Circuit Breakers

Switchgear Insulating Bottles & Studs

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Rear Insulating Panel in Circuit Breaker Cell

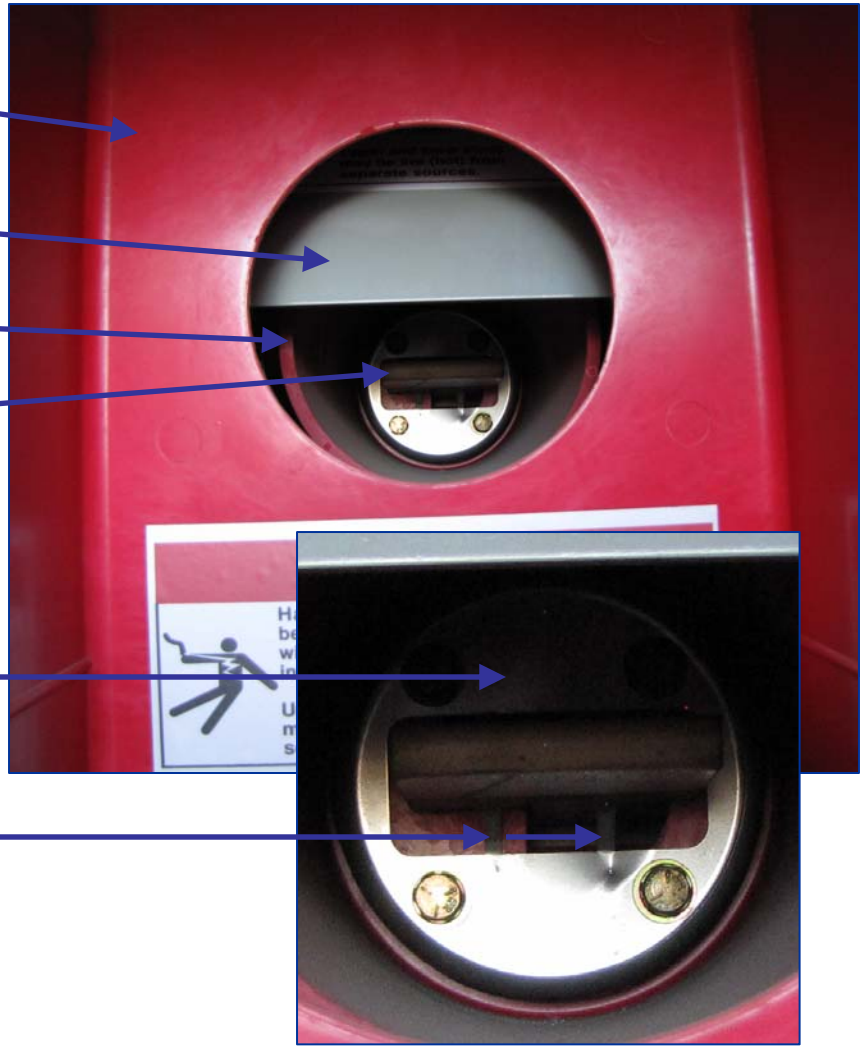
Shutter Assembly

Insulating Bottle

Bus Stud

Insulating Bottle Mounting Plate

Fingers (2) to Electrically Bond Mounting Plate to Bus Stud (Spring Pressure for Contact)



Prior Known Issue

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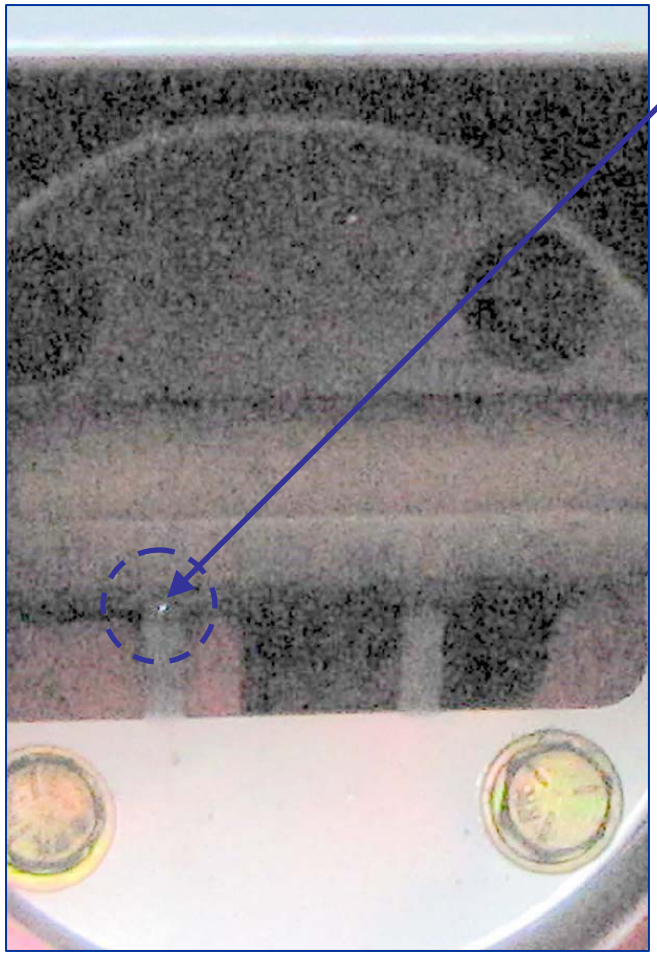

Photo shows a discharge (e.g. the small white spot) occurring between Insulating Bottle Mounting Plate's fingers and the Bus Stud.

This problem was found in the last cell of the substation, nearest to the transformer.

This problem was found via visual inspection and it was repaired on a prior date (e.g. prior to the PDS100 surveys presented in this case study).

TEV Probe Survey Locations

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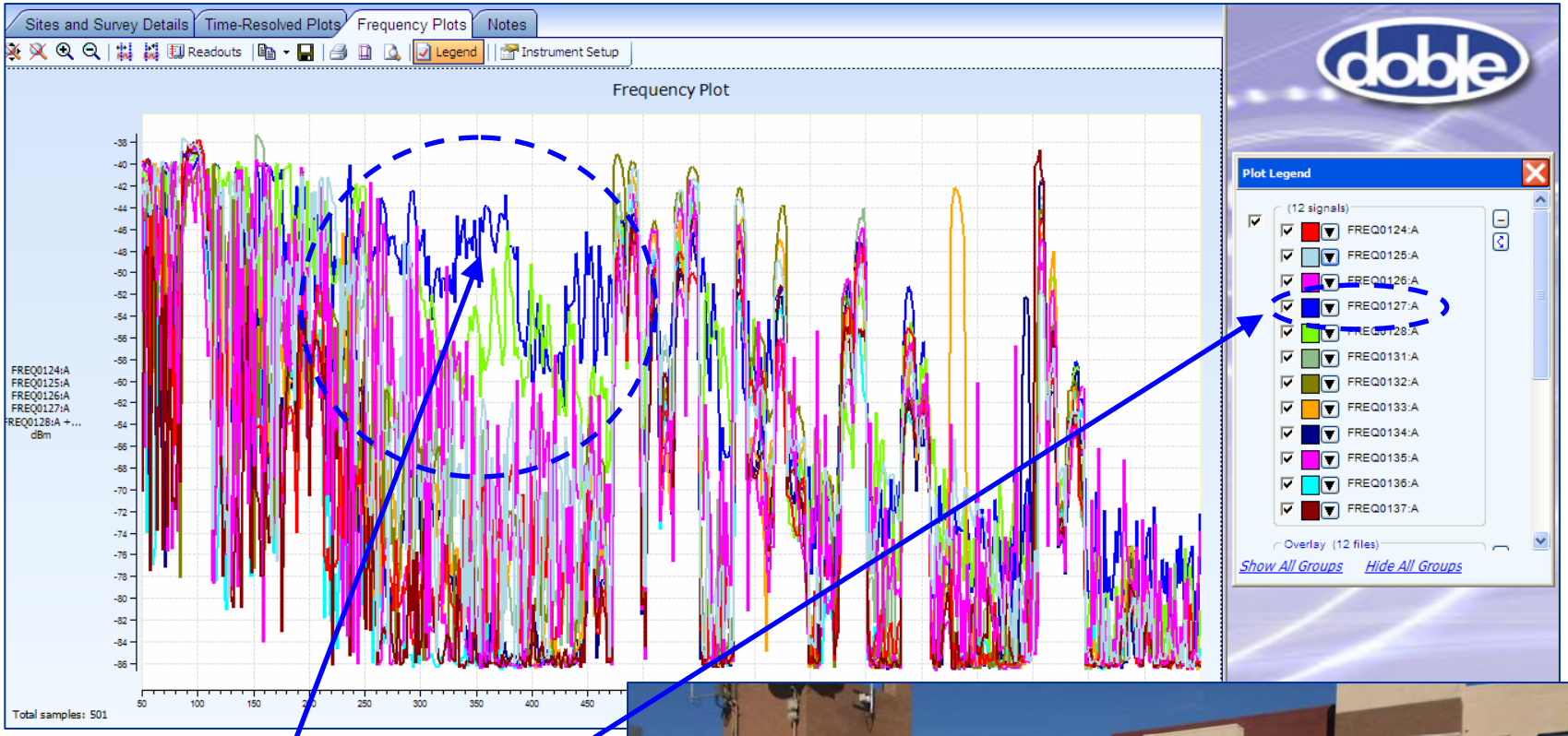
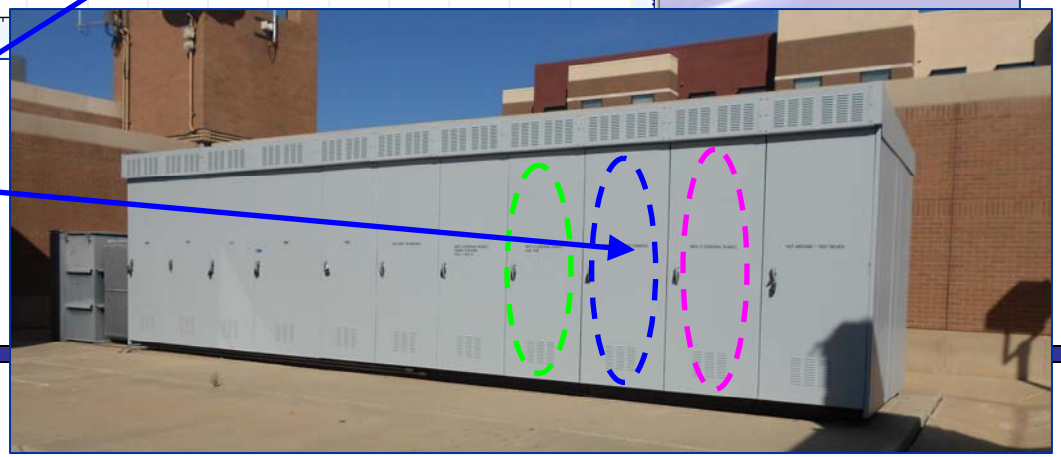
Readings were taken from the center of the external door panels on each cell of the switchgear using the <u>TEV Probe</u>.

TEV Probe Survey Overlay



Largest reading from 3rd cell (blue plot). Adjacent cells (green and purple) had lower amplitudes.



PDS100 Metal-Clad Sub Case

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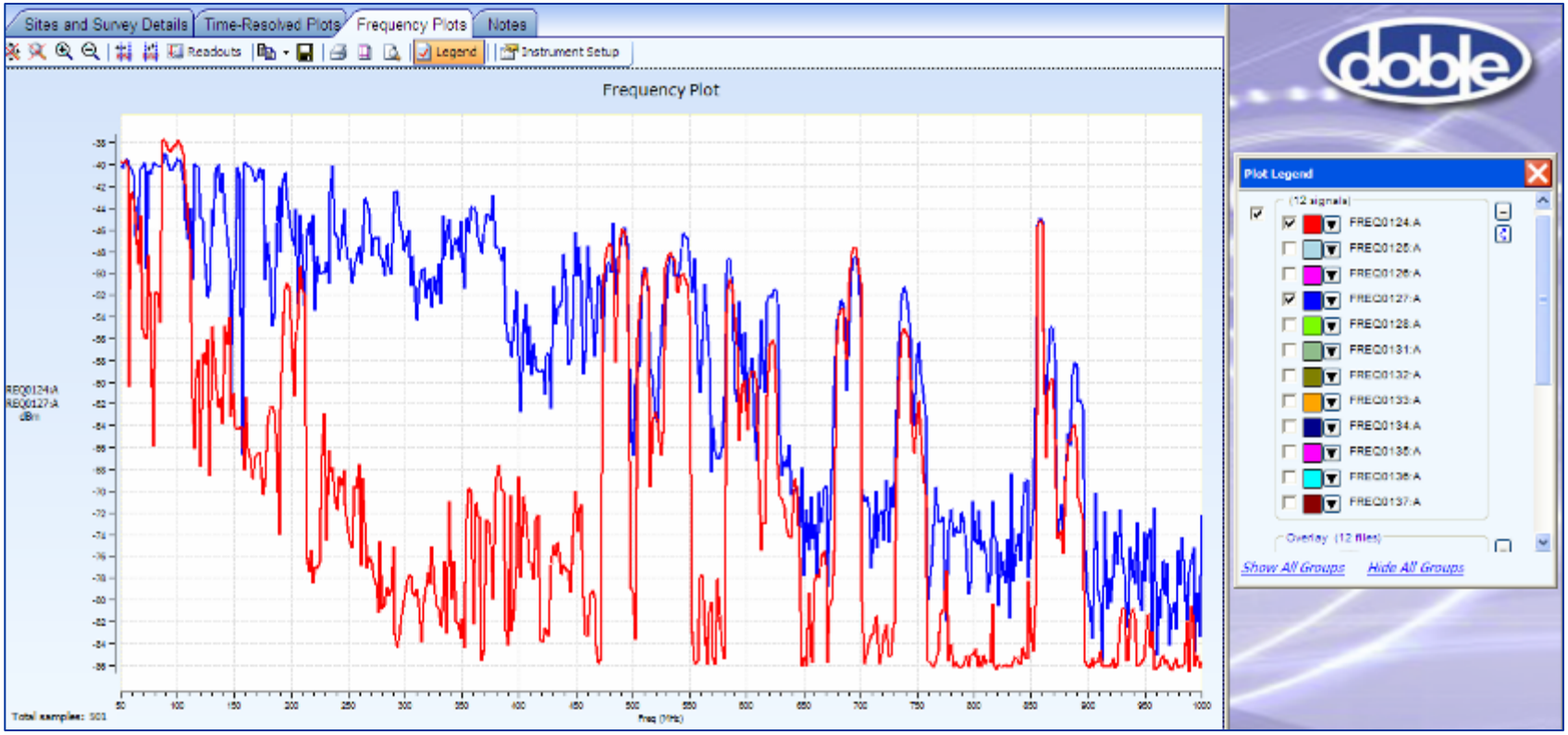
TEV Probe Survey Overlay



Baseline reading (red plot) taken from metal door on building immediately adjacent to substation (e.g. a benign metal object in the same general location).

Largest reading (blue plot) from 3rd cell.

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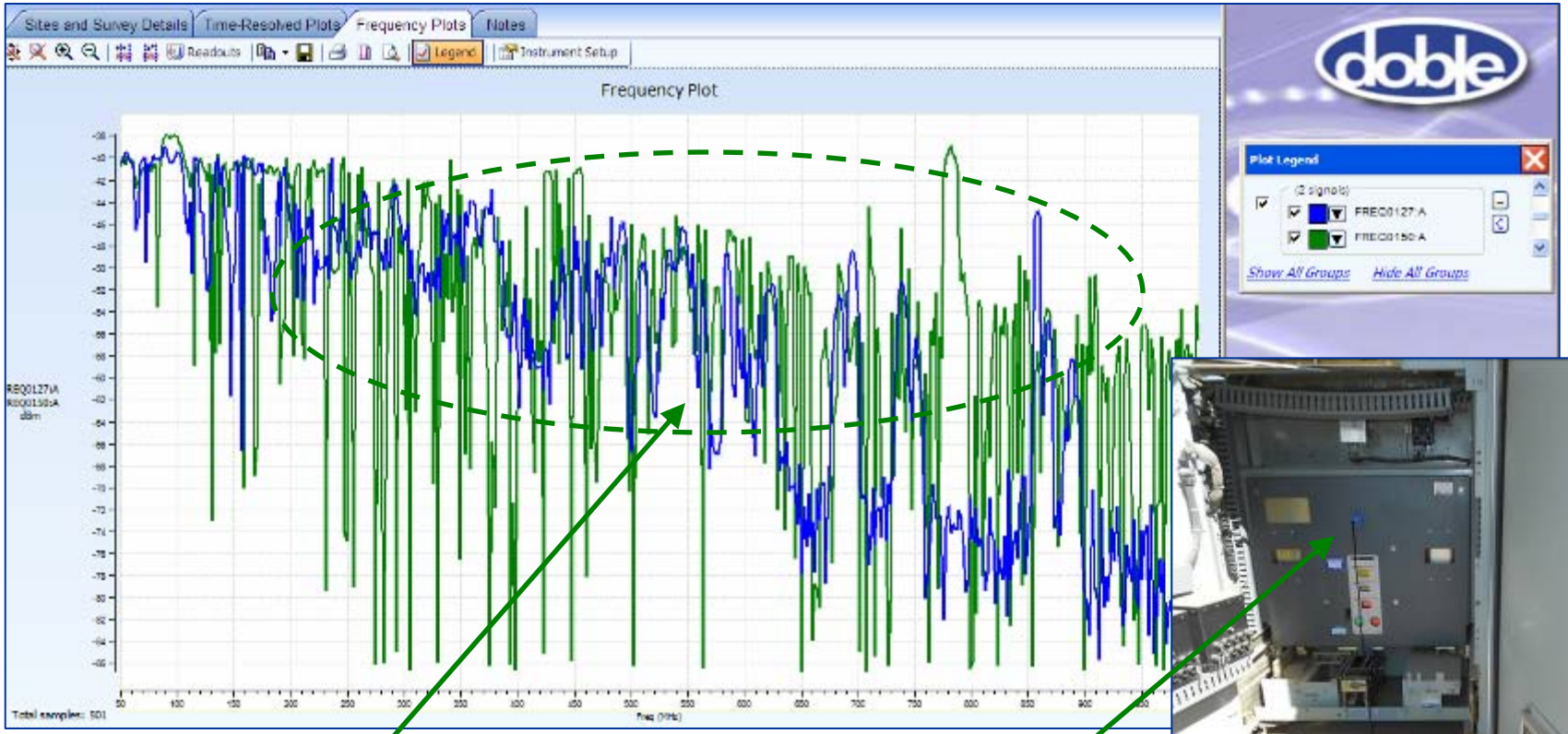
TEV Probe Survey Overlay



Internal breaker panel (green plot), 3rd cell. This reading clearly has greater amplitude.

External door panel (blue plot), 3rd cell.

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Whip Antenna Survey Locations

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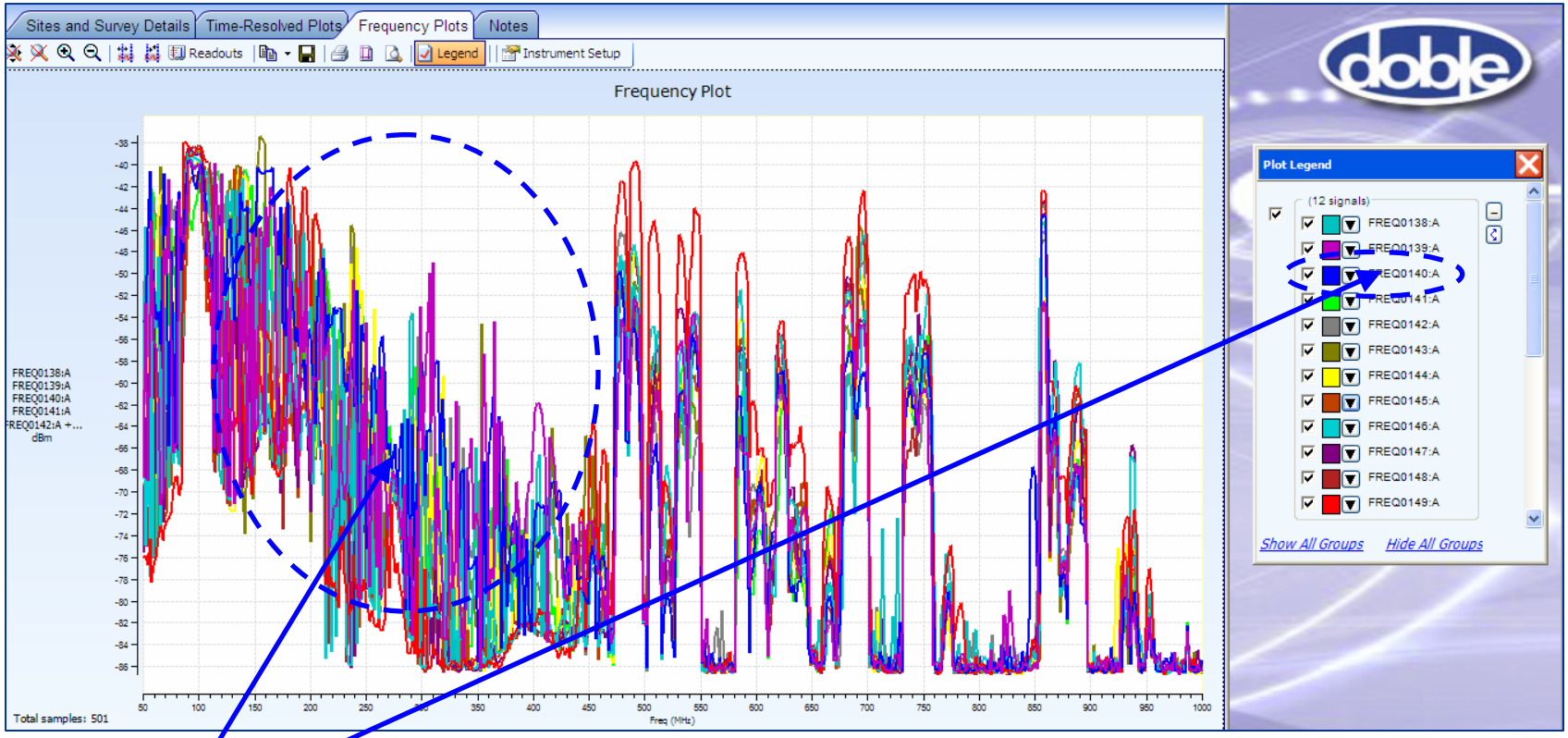
Readings were taken using the <u>Whip Antenna</u> with the PDS100 placed <u>on the ground in front of the vents for each cell</u>, starting at one end of the substation and working toward the other end.

Whip Antenna Survey Overlay



Once again the 3rd cell is identified (blue plot). The difference in amplitudes between the 3rd cell and adjacent cells was <u>very subtle</u> (e.g. barely conclusive).

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Case Observations & Conclusion

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OBSERVATIONS

- Both the TEV Probe and the Whip Antenna were able to identify the same "most suspect" cell in a metal-clad substation.
- However, it was much easier to identify the most suspect cell from the scans taken using the TEV Probe.
  - The results from the TEV Probe were very conclusive.
  - The results from the whip antenna provided only a very subtle indication (e.g. barely conclusive) of the most suspect cell.
- Readings from the internal panel of the switchgear provided even higher amplitudes (e.g. assumption = closer to the source).

CONCLUSION

- As expected, the results of this case study suggests that the best sensor for the metalclad substation application is the TEV Probe.

Cause of Elevated TEV Readings?

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Jury is Out

- This case study was gathered during a sales demonstration of the PDS100 and TEV Probe. As of the date when this presentation was prepared we have been given no feedback from the customer regarding any follow-up work or discoveries made after the demonstration.
- Given the known condition that was previously identified and repaired in another cell of this substation, we might surmise that the same problem (e.g. discharge between the bus studs and the insulating bottle mounting brackets) could be occurring in the location identified during this survey. However, until an investigation is conducted by the owner of the substation then this remains as speculation. There could be a completely different cause for the elevated TEV Probe readings