

# 4-50337-1-1\_X2



## Report Source

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

## Session Test Date

7/6/2020 11:04:52 AM

## Nameplate - Two-winding Transformer

|                   |                |                     |                   |
|-------------------|----------------|---------------------|-------------------|
| Company           | Tampa Electric | Serial Number       | C-03319-5-1       |
| Location          | BIG BEND       | Special ID          | 127               |
| Division          | SUBSTATION     | Circuit Designation | UNIT #2           |
| Manufacturer      | McGraw-Edison  | Configuration       | Y_D               |
| Year Manufactured | 1972           | Tank Type           | N2 Blanket        |
| Mfr Location      | CANONSBURG,PA. | Coolant             | Oil               |
| Phases            | Three          | Class               | FOA               |
| Oil Volume        | 14100 UG       | BIL                 | 825 kV            |
| Weight            | 606600         |                     |                   |
| kV                | 230, 23.4      | VA Rating           | 480, *, *, *, kVA |

## Administration

|                   |          |                       |          |                  |               |
|-------------------|----------|-----------------------|----------|------------------|---------------|
| Test Date         | 7/6/2020 | Test Time:            | 11:04 AM | Weather          | Partly Cloudy |
| Air Temperature   | 22°C     | Apparatus Temperature | 22°C     | Humidity         | 65 %          |
| Tester            | LEE      | Work Order            |          | Date Last Tested | 2/10/2011     |
| Verified          |          | Test Set Type         | M4100    | Date Retested    |               |
| Verification Date |          | Set Top Serial #      |          | Reason           |               |
| Last Sheet #      |          | Test Set Model        | M4100    | Travel Time      |               |
| Purchase Order    |          | Ins. Book #           |          | Duration         |               |
| Copies            |          | Sheet #               |          | Crew Size        | 3             |

## Arrester Nameplate

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| EAST -T  | N13764-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | N13764-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | N13764-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | N13765-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | N13765-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | N13765-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L89496-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L89496-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L89496-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial #   | Manufacturer            | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps  |
|-------------|------------|-------------------------|------|--------|--------|--------|--------|----------|-------|
|             | 1730046    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
|             | 1730045    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
|             | 1730047    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
| H0          | 2159986    | General Electric        | U    | 0.32   | 642    | *      | *      | 23       | 2000  |
| H1          | H24191     | McGraw-Edison           | PA   | 0.52   | 334    | *      | *      | 196      | 1600  |
| H2          | H24190     | McGraw-Edison           | PA   | 0.48   | 334    | *      | *      | 196      | 1600  |
| H3          | H24189     | McGraw-Edison           | PA   | 0.51   | 329    | *      | *      | 196      | 1600  |
| H4          | HC-SN-1    | OTHER                   |      | *      | *      | *      | *      | *        | *     |
| X1          | 1000112619 | ABB (ASEA-Brown Boveri) | A    | *      | *      | *      | *      | 25       | 12000 |
| X2          | 1000112620 | ABB (ASEA-Brown Boveri) | A    | *      | *      | *      | *      | 25       | 12000 |
| X3          | 1621228    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

Bushing Additional Details -X3

|                     |         |                   |           |                   |                   |
|---------------------|---------|-------------------|-----------|-------------------|-------------------|
| Designation         | X3      | Voltage           | Secondary | Serial #          | 1621228           |
| Catalog #           | 1B564G3 | Amps              | 2000 A    | BIL               | 150 kV            |
| Class               |         | Year              | 1982      | Drawing           |                   |
| Style               |         | Other             |           | S.O. Number       |                   |
| Physical Dimensions |         |                   |           |                   |                   |
| Creep Distance *    |         | Overall Length *  |           | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |         | Recess Depth *    |           | Outer Seal Dia. * | Slot Size *       |
| Units               |         |                   |           |                   |                   |
| Flange Dimensions   |         |                   |           |                   |                   |
| To Bottom *         |         | # Bolts *         |           | Max. Diameters    | Draw Lead         |
| To Top *            |         | Bolt Size *       |           | Below Flange *    | Tube ID *         |
|                     |         | Circle Diameter * |           | Above Flange *    | To Pin *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA      | Watts | PF*TCF [%] | Corr Fctr | Cap (pF)  | FRANK™      | Manual |
|-----------------------------------------------------|-------------------|---------|---------|-------|------------|-----------|-----------|-------------|--------|
| 1                                                   | CH+CHL            | 10.004  | 170.608 | 5.155 | 0.289      | 0.957     | 45255.300 |             |        |
| 2                                                   | CH                | 10.000  | 37.100  | 1.618 | 0.417      | 0.957     | 9840.837  | Investigate |        |
| 3                                                   | CHL<br>(Measured) | 10.003  | 133.469 | 3.523 | 0.253      | 0.957     | 35403.247 | Good        |        |
| 4                                                   | CHL               | 0       | 133.509 | 3.537 | 0.253      | 0.957     | 35414.462 |             |        |
| 5                                                   | CL+CHL            | 9.006   | 253.051 | 7.470 | 0.282      | 0.957     | 67123.512 |             |        |
| 6                                                   | CL                | 9.004   | 119.521 | 3.983 | 0.319      | 0.957     | 31703.504 | Good        |        |
| 7                                                   | CHL<br>(Measured) | 9.005   | 133.486 | 3.366 | 0.241      | 0.957     | 35407.870 |             |        |
| 8                                                   | CHL               | 0       | 133.530 | 3.487 | 0.250      | 0.957     | 35420.008 | Good        |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |         |       |            |           |           |             |        |
|                                                     | CH-C1             | CH'     | 30.958  | 1.378 | 0.426      | 0.957     | 8211.757  |             |        |
|                                                     | CL-C1             | CL'     | 119.521 | 3.983 | 0.319      | 0.957     | 31703.504 |             |        |

|                |                                                                                                                                                                                                                                                                                                                                  |                         |                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------|
| LSR            | mA: 170.608/170.608, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 5.155/5.155, 1/1 | Cap (pF): 45255.300/45255.300, 1/1 |
| LSR            | mA: 37.100/37.100, 1/1                                                                                                                                                                                                                                                                                                           | Watts: 1.618/1.618, 1/1 | Cap (pF): 9840.837/9840.837, 1/1   |
| LSR            | mA: 133.469/133.469, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 3.523/3.523, 1/1 | Cap (pF): 35403.247/35403.247, 1/1 |
| LSR            | mA: 133.509/133.509, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 3.537/3.537, 1/1 | Cap (pF): 35414.462/35414.462, 1/1 |
| LSR            | mA: 253.051/253.051, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 7.470/7.470, 1/1 | Cap (pF): 67123.512/67123.512, 1/1 |
| LSR            | mA: 119.521/119.521, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 3.983/3.983, 1/1 | Cap (pF): 31703.504/31703.504, 1/1 |
| LSR            | mA: 133.486/133.486, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 3.366/3.366, 1/1 | Cap (pF): 35407.870/35407.870, 1/1 |
| LSR            | mA: 133.530/133.530, 1/1                                                                                                                                                                                                                                                                                                         | Watts: 3.487/3.487, 1/1 | Cap (pF): 35420.008/35420.008, 1/1 |
| LSR            | mA: 30.958/30.958, 1/1                                                                                                                                                                                                                                                                                                           | Watts: 1.378/1.378, 1/1 | Cap (pF): 8211.757/8211.757, 1/1   |
| LSR            | mA: */*, 1/1                                                                                                                                                                                                                                                                                                                     | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |
| FRANK™ Message | 2 (Investigate) - The power factor value is higher than is normally expected for this type of transformer, and does not compare with the previous test result. Try and determine which result is correct, and add a note indicating your findings. If the previous test is the right one, check your test procedures and retest. |                         |                                    |
|                | For this transformer, the upper % power factor limit for a "G" rating is 0.4 and the upper % power factor limit before an "I" rating is 0.6                                                                                                                                                                                      |                         |                                    |
|                | The relative humidity is between 45 and 70 percent, a medium amount, which may cause some increases in watts and power factor ratings. Clean and dry the surfaces of bushings arresters, and other apparatus with insulators onto which may condense moisture from the air, before testing, using heat if necessary.             |                         |                                    |

## Bushing Test (C1)

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 2159986  | 10.012  | 2.446 | 0.094 | 0.999     | 0.383      | 0.32   | 648.761  | 642    | Good   |        |
| H1 | H24191   | 10.008  | 1.237 | 0.051 | 1.044     | 0.434      | 0.52   | 328.000  | 334    | Good   |        |
| H2 | H24190   | 10.013  | 1.240 | 0.044 | 1.044     | 0.367      | 0.48   | 328.922  | 334    | Good   |        |
| H3 | H24189   | 10.003  | 1.219 | 0.052 | 1.044     | 0.442      | 0.51   | 323.397  | 329    | Good   |        |

|     |                      |  |                         |  |                                |  |  |  |  |
|-----|----------------------|--|-------------------------|--|--------------------------------|--|--|--|--|
| LSR | mA: 2.446/2.446, 1/1 |  | Watts: 0.094/0.094, 1/1 |  | Cap (pF): 648.761/648.761, 1/1 |  |  |  |  |
| LSR | mA: 1.237/1.237, 1/1 |  | Watts: 0.051/0.051, 1/1 |  | Cap (pF): 328.000/328.000, 1/1 |  |  |  |  |
| LSR | mA: 1.240/1.240, 1/1 |  | Watts: 0.044/0.044, 1/1 |  | Cap (pF): 328.922/328.922, 1/1 |  |  |  |  |
| LSR | mA: 1.219/1.219, 1/1 |  | Watts: 0.052/0.052, 1/1 |  | Cap (pF): 323.397/323.397, 1/1 |  |  |  |  |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 2159986  | 0.498   | 1.929  | 0.096 | 1         | 0.498      | *      | 511.749  | *      | Good   |        |
| H1 | H24191   | 2.001   | 15.307 | 0.668 | 1         | 0.436      | *      | 4060.358 | *      | Good   |        |
| H2 | H24190   | 1.998   | 15.018 | 0.642 | 1         | 0.427      | *      | 3983.630 | *      | Good   |        |
| H3 | H24189   | 2.001   | 15.080 | 0.681 | 1         | 0.452      | *      | 4000.054 | *      | Good   |        |

|            |                        |  |                         |  |                                  |  |
|------------|------------------------|--|-------------------------|--|----------------------------------|--|
| <b>LSR</b> | mA: 1.929/1.929, 1/1   |  | Watts: 0.096/0.096, 1/1 |  | Cap (pF): 511.749/511.749, 1/1   |  |
| <b>LSR</b> | mA: 15.307/15.307, 1/1 |  | Watts: 0.668/0.668, 1/1 |  | Cap (pF): 4060.358/4060.358, 1/1 |  |
| <b>LSR</b> | mA: 15.018/15.018, 1/1 |  | Watts: 0.642/0.642, 1/1 |  | Cap (pF): 3983.630/3983.630, 1/1 |  |
| <b>LSR</b> | mA: 15.080/15.080, 1/1 |  | Watts: 0.681/0.681, 1/1 |  | Cap (pF): 4000.054/4000.054, 1/1 |  |



## Hot Collar Tests

| ID | Serial #   | Test Mode | Skirt # | Standard |       |       | Legacy (GST, optional) |       |       | FRANK™      | Manual |
|----|------------|-----------|---------|----------|-------|-------|------------------------|-------|-------|-------------|--------|
|    |            |           |         | Test kV  | mA    | Watts | Test kV                | mA    | Watts |             |        |
|    | 1730046    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730046    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730046    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
| X1 | 1000112619 | UST RB    | 2       | 10.003   | 0.192 | 0.052 | *                      | 0.192 | *     | Investigate |        |
| X2 | 1000112620 | UST RB    | 2       | 10.003   | 0.211 | 0.186 | *                      | 0.211 | *     |             |        |
| X3 | 1621228    | UST RB    | 2       | 10.002   | 0.218 | 0.066 | *                      | 0.218 | *     |             |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                 |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------------|
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>FRANK™ Message</b> 10 (Unrated) - Current evaluation is based on the means of all currents at the same skirt. This line will be rerated testing at least three similar bushings at this same skirt position.<br><br>The watts losses are within the acceptable range.<br><br>11 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. This line will be rerated testing at least three similar bushings at this same skirt position.<br><br>Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.<br><br>12 (Unrated) - Current evaluation is based on the means of all currents at the same skirt. This line will be rerated testing at least three similar bushings at this same skirt position.<br><br>The watts losses are within the acceptable range. |              |                 |                    |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| EAST -T  | GAR Red   | 10.002  | 0.233 | 0.067 |        |        |
| EAST-B   | GAR Red   | 10.010  | 0.229 | 0.061 |        |        |
| EAST-M   | UST Red   | 10.012  | 0.171 | 0.051 |        |        |
| MID-B    | GAR Red   | 10.009  | 0.231 | 0.067 |        |        |
| MID-M    | UST Red   | 10.010  | 0.171 | 0.053 |        |        |
| MID-T    | GAR Red   | 10.010  | 0.234 | 0.071 |        |        |
| WEST-B   | GAR Red   | 10.010  | 0.238 | 0.069 |        |        |
| WEST-M   | UST Red   | 10.001  | 0.177 | 0.053 |        |        |
| WEST-T   | GAR Red   | 10.002  | 0.238 | 0.066 |        |        |

|     |                      |                         |                    |
|-----|----------------------|-------------------------|--------------------|
| LSR | mA: 0.233/0.233, 1/1 | Watts: 0.067/0.067, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.229/0.229, 1/1 | Watts: 0.061/0.061, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.171/0.171, 1/1 | Watts: 0.051/0.051, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.231/0.231, 1/1 | Watts: 0.067/0.067, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.171/0.171, 1/1 | Watts: 0.053/0.053, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.234/0.234, 1/1 | Watts: 0.071/0.071, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.238/0.238, 1/1 | Watts: 0.069/0.069, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.177/0.177, 1/1 | Watts: 0.053/0.053, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.238/0.238, 1/1 | Watts: 0.066/0.066, 1/1 | Cap (pF): */*, 1/1 |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

2/19/2016 8:36:58 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |         |                         |                     |
|--------------------------|-----------|------------------------------|---------|-------------------------|---------------------|
| <b>Test Date</b>         | 2/19/2016 | <b>Test Time:</b>            | 8:36 AM | <b>Weather</b>          | Partly Cloudy       |
| <b>Air Temperature</b>   | 14°C      | <b>Apparatus Temperature</b> | 13°C    | <b>Humidity</b>         | 69 %                |
| <b>Tester</b>            | crowell   | <b>Work Order</b>            |         | <b>Date Last Tested</b> | 2/10/2011           |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100   | <b>Date Retested</b>    |                     |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |         | <b>Reason</b>           | Bushing Replacement |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100   | <b>Travel Time</b>      |                     |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |         | <b>Duration</b>         |                     |
| <b>Copies</b>            |           | <b>Sheet #</b>               |         | <b>Crew Size</b>        | 5                   |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| EAST -T  | N13764-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | N13764-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | N13764-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | N13765-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | N13765-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | N13765-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L89496-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L89496-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L89496-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial #   | Manufacturer            | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps  |
|-------------|------------|-------------------------|------|--------|--------|--------|--------|----------|-------|
|             | 1730046    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
|             | 1730045    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
|             | 1730047    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |
| H0          | 2159986    | General Electric        | U    | 0.32   | 642    | *      | *      | 23       | 2000  |
| H1          | H24191     | McGraw-Edison           | PA   | 0.52   | 334    | *      | *      | 196      | 1600  |
| H2          | H24190     | McGraw-Edison           | PA   | 0.48   | 334    | *      | *      | 196      | 1600  |
| H3          | H24189     | McGraw-Edison           | PA   | 0.51   | 329    | *      | *      | 196      | 1600  |
| X1          | 1000112619 | ABB (ASEA-Brown Boveri) | A    | *      | *      | *      | *      | 25       | 12000 |
| X2          | 1000112620 | ABB (ASEA-Brown Boveri) | A    | *      | *      | *      | *      | 25       | 12000 |
| X3          | 1621228    | General Electric        | A    | *      | *      | *      | *      | 23       | 2000  |

## Bushing Additional Details -H1

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Bushing Additional Details -H2

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

### Overall Tests

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10.002         | 170.229   | 6.139        | 0.422             | 1.169            | 45152.451       |               |               |
| 2                                                   | CH                | 10.001         | 36.981    | 2.107        | 0.666             | 1.169            | 9809.455        | Investigate   |               |
| 3                                                   | CHL<br>(Measured) | 10.000         | 133.213   | 3.988        | 0.350             | 1.169            | 35334.301       | Good          |               |
| 4                                                   | CHL               | 0              | 133.247   | 4.031        | 0.354             | 1.169            | 35342.996       |               |               |
| 5                                                   | CL+CHL            | 10.004         | 252.111   | 8.965        | 0.416             | 1.169            | 66874.051       |               |               |
| 6                                                   | CL                | 10.001         | 118.872   | 4.995        | 0.491             | 1.169            | 31532.450       | Deteriorated  |               |
| 7                                                   | CHL<br>(Measured) | 10.002         | 133.206   | 3.996        | 0.351             | 1.169            | 35333.899       |               |               |
| 8                                                   | CHL               | 0              | 133.239   | 3.970        | 0.348             | 1.169            | 35341.602       | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 36.981    | 2.107        | 0.666             | 1.169            | 9809.455        |               |               |
|                                                     | CL-C1             | CL'            | 118.872   | 4.995        | 0.491             | 1.169            | 31532.450       |               |               |

|            |                          |                         |                                    |
|------------|--------------------------|-------------------------|------------------------------------|
| <b>LSR</b> | mA: 170.229/170.229, 1/1 | Watts: 6.139/6.139, 1/1 | Cap (pF): 45152.451/45152.451, 1/1 |
| <b>LSR</b> | mA: 36.981/36.981, 1/1   | Watts: 2.107/2.107, 1/1 | Cap (pF): 9809.455/9809.455, 1/1   |
| <b>LSR</b> | mA: 133.213/133.213, 1/1 | Watts: 3.988/3.988, 1/1 | Cap (pF): 35334.301/35334.301, 1/1 |
| <b>LSR</b> | mA: 133.247/133.247, 1/1 | Watts: 4.031/4.031, 1/1 | Cap (pF): 35342.996/35342.996, 1/1 |
| <b>LSR</b> | mA: 252.111/252.111, 1/1 | Watts: 8.965/8.965, 1/1 | Cap (pF): 66874.051/66874.051, 1/1 |
| <b>LSR</b> | mA: 118.872/118.872, 1/1 | Watts: 4.995/4.995, 1/1 | Cap (pF): 31532.450/31532.450, 1/1 |
| <b>LSR</b> | mA: 133.206/133.206, 1/1 | Watts: 3.996/3.996, 1/1 | Cap (pF): 35333.899/35333.899, 1/1 |
| <b>LSR</b> | mA: 133.239/133.239, 1/1 | Watts: 3.970/3.970, 1/1 | Cap (pF): 35341.602/35341.602, 1/1 |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |

**FRANK™ Message**

2 (Investigate) - The measured power factor is abnormally high for this type of apparatus, does not compare to Initial tests. Clean and dry the bushings, check connections, and retest. Call your supervisor or Doble.

For this transformer, the upper % power factor limit for a "G" rating is 0.4 and the upper % power factor limit before an "I" rating is 0.6

The relative humidity is between 45 and 70 percent, a medium amount, which may cause some increases in watts and power factor ratings. Clean and dry the surfaces of bushings arresters, and other apparatus with insulators onto which may condense moisture from the air, before testing, using heat if necessary.

6 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.

**Hot Collar Tests**

| ID | Serial #   | Test Mode | Skirt # | Standard |       |       | Legacy (GST, optional) |       |       | FRANK™      | Manual |
|----|------------|-----------|---------|----------|-------|-------|------------------------|-------|-------|-------------|--------|
|    |            |           |         | Test kV  | mA    | Watts | Test kV                | mA    | Watts |             |        |
|    | 1730046    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730046    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730046    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730045    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 1       | *        | *     | *     | *                      | *     | *     |             |        |
|    | 1730047    | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |
| X1 | 1000112619 | UST RB    | 2       | 10.000   | 0.166 | 0.142 | *                      | 0.166 | *     | Investigate |        |
| X2 | 1000112620 | UST RB    | 2       | 9.999    | 0.181 | 0.183 | *                      | 0.181 | *     | Investigate |        |
| X3 | 1621228    | UST RB    | 2       | 10.000   | 0.202 | 0.090 | *                      | 0.202 | *     |             |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

**FRANK™ Message**

10 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

11 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

12 (Unrated) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

The watts losses are within the acceptable range.



Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

Surge Arrester Tests

| Location | Test Mode | Test kV | mA | Watts | FRANK™ | Manual |
|----------|-----------|---------|----|-------|--------|--------|
| EAST -T  | GAR Red   | 9.999   | *  | *     |        |        |
| EAST-B   | GAR Red   | 9.999   | *  | *     |        |        |
| EAST-M   | UST Red   | 9.999   | *  | *     |        |        |
| MID-B    | GAR Red   | 9.998   | *  | *     |        |        |
| MID-M    | UST Red   | 9.999   | *  | *     |        |        |
| MID-T    | GAR Red   | 9.998   | *  | *     |        |        |
| WEST-B   | GAR Red   | 9.999   | *  | *     |        |        |
| WEST-M   | UST Red   | 9.998   | *  | *     |        |        |
| WEST-T   | GAR Red   | 9.998   | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

2/1/2016 10:36:50 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |          |                              |          |                         |               |
|--------------------------|----------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 2/1/2016 | <b>Test Time:</b>            | 10:36 AM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 22°C     | <b>Apparatus Temperature</b> | 23°C     | <b>Humidity</b>         | 65 %          |
| <b>Tester</b>            | crowell  | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 2/10/2011     |
| <b>Verified</b>          |          | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> | 2/1/2016 | <b>Set Top Serial #</b>      |          | <b>Reason</b>           | Trouble       |
| <b>Last Sheet #</b>      |          | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |          | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |          | <b>Sheet #</b>               |          | <b>Crew Size</b>        | 3             |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| EAST -T  | N13764-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | N13764-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | N13764-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | N13765-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | N13765-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | N13765-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L89496-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L89496-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L89496-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 2159986  | General Electric | U    | 0.32   | 642    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

## Bushing Additional Details -H1

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H1      |             | Voltage Primary   |        | Serial # H24191   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

## Bushing Additional Details -H2

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H2      |             | Voltage Primary   |        | Serial # H24190   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

### Overall Tests

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10.003         | 170.259   | 5.530        | 0.304             | 0.936            | 45161.750       |               |               |
| 2                                                   | CH                | 10.002         | 37.092    | 1.931        | 0.487             | 0.936            | 9838.780        | Deteriorated  |               |
| 3                                                   | CHL<br>(Measured) | 10.001         | 133.129   | 3.656        | 0.257             | 0.936            | 35313.400       | Good          |               |
| 4                                                   | CHL               | 0              | 133.166   | 3.599        | 0.253             | 0.936            | 35322.970       |               |               |
| 5                                                   | CL+CHL            | 10.005         | 253.609   | 8.945        | 0.330             | 0.936            | 67273.199       |               |               |
| 6                                                   | CL                | 10.002         | 120.394   | 5.265        | 0.409             | 0.936            | 31934.551       | Deteriorated  |               |
| 7                                                   | CHL<br>(Measured) | 10.003         | 133.157   | 3.568        | 0.251             | 0.936            | 35319.200       |               |               |
| 8                                                   | CHL               | 0              | 133.215   | 3.680        | 0.259             | 0.936            | 35338.648       | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 30.978    | 1.705        | 0.515             | 0.936            | 8216.743        |               |               |
|                                                     | CL-C1             | CL'            | 120.394   | 5.265        | 0.409             | 0.936            | 31934.551       |               |               |

|            |                          |                         |                                    |
|------------|--------------------------|-------------------------|------------------------------------|
| <b>LSR</b> | mA: 170.259/170.259, 1/1 | Watts: 5.530/5.530, 1/1 | Cap (pF): 45161.750/45161.750, 1/1 |
| <b>LSR</b> | mA: 37.092/37.092, 1/1   | Watts: 1.931/1.931, 1/1 | Cap (pF): 9838.780/9838.780, 1/1   |
| <b>LSR</b> | mA: 133.129/133.129, 1/1 | Watts: 3.656/3.656, 1/1 | Cap (pF): 35313.400/35313.400, 1/1 |
| <b>LSR</b> | mA: 133.166/133.166, 1/1 | Watts: 3.599/3.599, 1/1 | Cap (pF): 35322.970/35322.970, 1/1 |
| <b>LSR</b> | mA: 253.609/253.609, 1/1 | Watts: 8.945/8.945, 1/1 | Cap (pF): 67273.199/67273.199, 1/1 |
| <b>LSR</b> | mA: 120.394/120.394, 1/1 | Watts: 5.265/5.265, 1/1 | Cap (pF): 31934.551/31934.551, 1/1 |
| <b>LSR</b> | mA: 133.157/133.157, 1/1 | Watts: 3.568/3.568, 1/1 | Cap (pF): 35319.200/35319.200, 1/1 |
| <b>LSR</b> | mA: 133.215/133.215, 1/1 | Watts: 3.680/3.680, 1/1 | Cap (pF): 35338.648/35338.648, 1/1 |
| <b>LSR</b> | mA: 30.978/30.978, 1/1   | Watts: 1.705/1.705, 1/1 | Cap (pF): 8216.743/8216.743, 1/1   |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |

**FRANK™ Message**

2 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.

For this transformer, the upper % power factor limit for a "G" rating is 0.4 and the upper % power factor limit before an "I" rating is 0.6

The relative humidity is between 45 and 70 percent, a medium amount, which may cause some increases in watts and power factor ratings. Clean and dry the surfaces of bushings arresters, and other apparatus with insulators onto which may condense moisture from the air, before testing, using heat if necessary.

6 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 2159986  | 10.005  | 2.436 | 0.079 | 0.999     | 0.322      | 0.32   | 646.246  | 642    | Good   |        |
| H1 | H24191   | 10.002  | 1.229 | 0.050 | 1.055     | 0.430      | 0.52   | 326.112  | 334    | Good   |        |
| H2 | H24190   | 10.008  | 1.235 | 0.050 | 1.055     | 0.424      | 0.48   | 327.533  | 334    | Good   |        |
| H3 | H24189   | 10.004  | 1.214 | 0.048 | 1.055     | 0.417      | 0.51   | 322.147  | 329    | Good   |        |

|     |                      |  |                         |  |                                |  |
|-----|----------------------|--|-------------------------|--|--------------------------------|--|
| LSR | mA: 2.436/2.436, 1/1 |  | Watts: 0.079/0.079, 1/1 |  | Cap (pF): 646.246/646.246, 1/1 |  |
| LSR | mA: 1.229/1.229, 1/1 |  | Watts: 0.050/0.050, 1/1 |  | Cap (pF): 326.112/326.112, 1/1 |  |
| LSR | mA: 1.235/1.235, 1/1 |  | Watts: 0.050/0.050, 1/1 |  | Cap (pF): 327.533/327.533, 1/1 |  |
| LSR | mA: 1.214/1.214, 1/1 |  | Watts: 0.048/0.048, 1/1 |  | Cap (pF): 322.147/322.147, 1/1 |  |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 2159986  | 0.498   | 1.960  | 0.099 | 1         | 0.507      | *      | 519.821  | *      |        |        |
| H1 | H24191   | 1.999   | 15.354 | 0.839 | 1         | 0.547      | *      | 4072.620 | *      | Good   |        |
| H2 | H24190   | 1.998   | 15.024 | 0.770 | 1         | 0.512      | *      | 3985.265 | *      | Good   |        |
| H3 | H24189   | 1.999   | 15.113 | 0.909 | 1         | 0.602      | *      | 4009.215 | *      | Good   |        |

|     |                        |  |                         |  |                                  |  |
|-----|------------------------|--|-------------------------|--|----------------------------------|--|
| LSR | mA: 1.960/1.960, 1/1   |  | Watts: 0.099/0.099, 1/1 |  | Cap (pF): 519.821/519.821, 1/1   |  |
| LSR | mA: 15.354/15.354, 1/1 |  | Watts: 0.839/0.839, 1/1 |  | Cap (pF): 4072.620/4072.620, 1/1 |  |
| LSR | mA: 15.024/15.024, 1/1 |  | Watts: 0.770/0.770, 1/1 |  | Cap (pF): 3985.265/3985.265, 1/1 |  |
| LSR | mA: 15.113/15.113, 1/1 |  | Watts: 0.909/0.909, 1/1 |  | Cap (pF): 4009.215/4009.215, 1/1 |  |

**FRANK™ Message**

1 (Unrated) - The C2 upper limit for a "G" rating is 1.0%

The C2 lower limit for a "G" rating is 0.1%

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X1 | 1730046  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X1 | 1730046  | UST RB    | 4       | *        | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | UST RB    | 4       | *        | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | UST RB    | 1       | *        | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | UST RB    | 4       | *        | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

### Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

### Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| EAST -T  | GAR Red   | 9.999   | 0.227 | 0.043 |        | Good   |
| EAST-B   | GAR Red   | 9.999   | 0.223 | 0.040 |        | Good   |
| EAST-M   | UST Red   | 9.999   | 0.160 | 0.040 |        | Good   |
| MID-B    | GAR Red   | 9.998   | 0.224 | 0.045 |        | Good   |
| MID-M    | UST Red   | 9.999   | 0.160 | 0.040 |        | Good   |
| MID-T    | GAR Red   | 9.998   | 0.226 | 0.046 |        | Good   |
| WEST-B   | GAR Red   | 9.999   | 0.232 | 0.045 |        | Good   |
| WEST-M   | UST Red   | 9.998   | 0.167 | 0.041 |        | Good   |
| WEST-T   | GAR Red   | 9.998   | 0.232 | 0.044 |        | Good   |

|     |                      |                         |                    |
|-----|----------------------|-------------------------|--------------------|
| LSR | mA: 0.227/0.227, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.223/0.223, 1/1 | Watts: 0.040/0.040, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.160/0.160, 1/1 | Watts: 0.040/0.040, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.224/0.224, 1/1 | Watts: 0.045/0.045, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.160/0.160, 1/1 | Watts: 0.040/0.040, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.226/0.226, 1/1 | Watts: 0.046/0.046, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.232/0.232, 1/1 | Watts: 0.045/0.045, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.167/0.167, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: 0.232/0.232, 1/1 | Watts: 0.044/0.044, 1/1 | Cap (pF): */*, 1/1 |



**FRANK™ Message**

1 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

2 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

3 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

4 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

5 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

6 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

7 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

8 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

9 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

1/21/2015 12:41:27 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |          |                         |               |
|--------------------------|-----------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 1/21/2015 | <b>Test Time:</b>            | 12:41 PM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 24°C      | <b>Apparatus Temperature</b> | 20°C     | <b>Humidity</b>         | 47 %          |
| <b>Tester</b>            | Garland   | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 2/10/2011     |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |          | <b>Reason</b>           |               |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |           | <b>Sheet #</b>               |          | <b>Crew Size</b>        | 3             |

## Session Notes

**Hot Collar Line 1** -Lines 1-3 done on 1/22/2015. Test temp. was 24 C.  
Lines 4-9 done on 1/23/2015. Test temp. is 16 C.

## Arrester Nameplate

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| EAST -T  | N13764-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | N13764-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | N13764-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | N13765-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | N13765-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | N13765-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L89496-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L89496-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L89496-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 2159986  | General Electric | U    | 0.32   | 642    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

## Bushing Additional Details -H1

|                       |  |                   |  |                   |  |
|-----------------------|--|-------------------|--|-------------------|--|
| Designation H1        |  | Voltage Primary   |  | Serial # H24191   |  |
| Catalog # 4B07-T-9053 |  | Amps 1600 A       |  | BIL 900 kV        |  |
| Class                 |  | Year 1972         |  | Drawing           |  |
| Style                 |  | Other             |  | S.O. Number       |  |
| Physical Dimensions   |  |                   |  |                   |  |
| Creep Distance *      |  | Overall Length *  |  | Inner Seal Dia. * |  |
| Total Weight *        |  | Recess Depth *    |  | Outer Seal Dia. * |  |
| Units                 |  |                   |  | Eff. Gnd Sleeve * |  |
|                       |  |                   |  | Slot Size *       |  |
| Flange Dimensions     |  |                   |  |                   |  |
| To Bottom *           |  | # Bolts *         |  | Max. Diameters    |  |
| To Top *              |  | Bolt Size *       |  | Below Flange *    |  |
|                       |  | Circle Diameter * |  | Above Flange *    |  |
|                       |  |                   |  | Draw Lead         |  |
|                       |  |                   |  | Tube ID *         |  |
|                       |  |                   |  | To Pin *          |  |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

### Overall Tests

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10.003         | 170.384   | 5.498        | 0.323             | 1.000            | 45195.751       |               |               |
| 2                                                   | CH                | 10.002         | 37.042    | 1.689        | 0.456             | 1.000            | 9825.465        | Deteriorated  |               |
| 3                                                   | CHL<br>(Measured) | 10.003         | 133.302   | 3.772        | 0.283             | 1.000            | 35359.550       | Good          |               |
| 4                                                   | CHL               | 0              | 133.342   | 3.809        | 0.286             | 1.000            | 35370.286       |               |               |
| 5                                                   | CL+CHL            | 10.006         | 253.636   | 9.447        | 0.373             | 1.000            | 67280.300       |               |               |
| 6                                                   | CL                | 10.003         | 120.381   | 5.655        | 0.470             | 1.000            | 31932.851       | Deteriorated  |               |
| 7                                                   | CHL<br>(Measured) | 10.003         | 133.287   | 3.775        | 0.283             | 1.000            | 35354.951       |               |               |
| 8                                                   | CHL               | 0              | 133.255   | 3.793        | 0.285             | 1.000            | 35347.449       | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 30.926    | 1.452        | 0.470             | 1.000            | 8203.226        |               |               |
|                                                     | CL-C1             | CL'            | 120.381   | 5.655        | 0.470             | 1.000            | 31932.851       |               |               |

|     |                          |                         |                                    |
|-----|--------------------------|-------------------------|------------------------------------|
| LSR | mA: 170.384/170.384, 1/1 | Watts: 5.498/5.498, 1/1 | Cap (pF): 45195.751/45195.751, 1/1 |
| LSR | mA: 37.042/37.042, 1/1   | Watts: 1.689/1.689, 1/1 | Cap (pF): 9825.465/9825.465, 1/1   |
| LSR | mA: 133.302/133.302, 1/1 | Watts: 3.772/3.772, 1/1 | Cap (pF): 35359.550/35359.550, 1/1 |
| LSR | mA: 133.342/133.342, 1/1 | Watts: 3.809/3.809, 1/1 | Cap (pF): 35370.286/35370.286, 1/1 |
| LSR | mA: 253.636/253.636, 1/1 | Watts: 9.447/9.447, 1/1 | Cap (pF): 67280.300/67280.300, 1/1 |
| LSR | mA: 120.381/120.381, 1/1 | Watts: 5.655/5.655, 1/1 | Cap (pF): 31932.851/31932.851, 1/1 |
| LSR | mA: 133.287/133.287, 1/1 | Watts: 3.775/3.775, 1/1 | Cap (pF): 35354.951/35354.951, 1/1 |
| LSR | mA: 133.255/133.255, 1/1 | Watts: 3.793/3.793, 1/1 | Cap (pF): 35347.449/35347.449, 1/1 |
| LSR | mA: 30.926/30.926, 1/1   | Watts: 1.452/1.452, 1/1 | Cap (pF): 8203.226/8203.226, 1/1   |
| LSR | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |

**FRANK™ Message** 2 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.

For this transformer, the upper % power factor limit for a "G" rating is 0.4 and the upper % power factor limit before an "I" rating is 0.6

The relative humidity is between 45 and 70 percent, a medium amount, which may cause some increases in watts and power factor ratings. Clean and dry the surfaces of bushings arresters, and other apparatus with insulators onto which may condense moisture from the air, before testing, using heat if necessary.

6 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.

### Bushing Test (C1)

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™      | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|-------------|--------|
| H0 | 2159986  | 10.005  | 2.432 | 0.078 | 0.999     | 0.321      | 0.32   | 645.070  | 642    | Good        |        |
| H1 | H24191   | 10.003  | 1.231 | 0.039 | 1.044     | 0.331      | 0.52   | 326.435  | 334    | Investigate |        |
| H2 | H24190   | 10.008  | 1.236 | 0.052 | 1.044     | 0.437      | 0.48   | 327.830  | 334    | Good        |        |
| H3 | H24189   | 10.005  | 1.217 | 0.068 | 1.044     | 0.581      | 0.51   | 322.904  | 329    | Good        |        |

|     |                      |                         |                                |
|-----|----------------------|-------------------------|--------------------------------|
| LSR | mA: 2.432/2.432, 1/1 | Watts: 0.078/0.078, 1/1 | Cap (pF): 645.070/645.070, 1/1 |
| LSR | mA: 1.231/1.231, 1/1 | Watts: 0.039/0.039, 1/1 | Cap (pF): 326.435/326.435, 1/1 |
| LSR | mA: 1.236/1.236, 1/1 | Watts: 0.052/0.052, 1/1 | Cap (pF): 327.830/327.830, 1/1 |
| LSR | mA: 1.217/1.217, 1/1 | Watts: 0.068/0.068, 1/1 | Cap (pF): 322.904/322.904, 1/1 |

**FRANK™ Message** 2 (Investigate) - The C1 upper limit for a "G" rating is 0.5%

The C1 lower limit for a "G" rating is 0.1%

Power Factor is low compared to Nameplate.

Power Factor is low compared to the previous value.



**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 2159986  | 0.499   | 1.933  | 0.062 | 1         | 0.319      | *      | 512.709  | *      | Good         |        |
| H1 | H24191   | 2.000   | 15.298 | 0.937 | 1         | 0.613      | *      | 4058.030 | *      | Deteriorated |        |
| H2 | H24190   | 2.000   | 14.992 | 0.875 | 1         | 0.584      | *      | 3976.755 | *      | Deteriorated |        |
| H3 | H24189   | 2.000   | 15.064 | 1.014 | 1         | 0.673      | *      | 3995.875 | *      | Deteriorated |        |

|                       |                                                                                                                                                                                                                                                                                                                           |                         |                                  |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------|
| <b>LSR</b>            | mA: 1.933/1.933, 1/1                                                                                                                                                                                                                                                                                                      | Watts: 0.062/0.062, 1/1 | Cap (pF): 512.709/512.709, 1/1   |
| <b>LSR</b>            | mA: 15.298/15.298, 1/1                                                                                                                                                                                                                                                                                                    | Watts: 0.937/0.937, 1/1 | Cap (pF): 4058.030/4058.030, 1/1 |
| <b>LSR</b>            | mA: 14.992/14.992, 1/1                                                                                                                                                                                                                                                                                                    | Watts: 0.875/0.875, 1/1 | Cap (pF): 3976.755/3976.755, 1/1 |
| <b>LSR</b>            | mA: 15.064/15.064, 1/1                                                                                                                                                                                                                                                                                                    | Watts: 1.014/1.014, 1/1 | Cap (pF): 3995.875/3995.875, 1/1 |
| <b>FRANK™ Message</b> | 2 (Deteriorated) - The C2 upper limit for a "G" rating is 1.0%<br><br>The C2 lower limit for a "G" rating is 0.1%<br><br>Power Factor has increased since initial test.<br><br>3 (Deteriorated) - Power Factor has increased since initial test.<br><br>4 (Deteriorated) - Power Factor has increased since initial test. |                         |                                  |

**Hot Collar Tests**

| ID          | Serial #                                                                                              | Test Mode | Skirt # | Standard |       |       | Legacy (GST, optional) |       |       | FRANK™      | Manual |
|-------------|-------------------------------------------------------------------------------------------------------|-----------|---------|----------|-------|-------|------------------------|-------|-------|-------------|--------|
|             |                                                                                                       |           |         | Test kV  | mA    | Watts | Test kV                | mA    | Watts |             |        |
| X1          | 1730046                                                                                               | UST RB    | 1       | 10.010   | 0.241 | 0.433 | *                      | 0.241 | *     | Bad         |        |
| X2          | 1730045                                                                                               | UST RB    | 1       | 10.010   | 0.299 | 0.779 | *                      | 0.299 | *     | Bad         |        |
| X3          | 1730047                                                                                               | UST RB    | 1       | 10.024   | 0.264 | 0.210 | *                      | 0.264 | *     | Investigate |        |
| X1          | 1730046                                                                                               | UST RB    | 1       | 9.999    | 0.257 | 0.566 | *                      | 0.257 | *     | Bad         |        |
| X1          | 1730046                                                                                               | UST RB    | 4       | 10.000   | 0.153 | 0.198 | *                      | 0.153 | *     | Investigate |        |
| X2          | 1730045                                                                                               | UST RB    | 1       | 10.000   | 0.363 | 1.334 | *                      | 0.363 | *     | Bad         |        |
| X2          | 1730045                                                                                               | UST RB    | 4       | 10.000   | 0.208 | 0.488 | *                      | 0.208 | *     | Bad         |        |
| X3          | 1730047                                                                                               | UST RB    | 1       | 10.000   | 0.263 | 0.277 | *                      | 0.263 | *     | Investigate |        |
| X3          | 1730047                                                                                               | UST RB    | 4       | 10.000   | 0.188 | 0.174 | *                      | 0.188 | *     | Investigate |        |
| <b>Note</b> | Lines 1-3 done on 1/22/2015. Test temp. was 24 C.<br>Lines 4-9 done on 1/23/2015. Test temp. is 16 C. |           |         |          |       |       |                        |       |       |             |        |

|            |              |                 |                    |
|------------|--------------|-----------------|--------------------|
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>LSR</b> | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

**FRANK™ Message**

1 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.

2 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.

3 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

4 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.

5 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

6 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.

7 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.

8 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

9 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.

Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.

**Core Ground Test**

| Voltage | * | Resistance | * |
|---------|---|------------|---|
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| EAST -T  | GAR Red   | 10.000  | 0.239 | 0.043 |        |        |
| EAST-B   | GAR Red   | 10.000  | 0.234 | 0.043 |        |        |
| EAST-M   | UST Red   | 10.000  | 0.169 | 0.041 |        |        |
| MID-B    | GAR Red   | 9.999   | 0.233 | 0.046 |        |        |
| MID-M    | UST Red   | 9.999   | 0.168 | 0.041 |        |        |
| MID-T    | GAR Red   | 9.999   | 0.236 | 0.044 |        |        |
| WEST-B   | GAR Red   | 10.000  | 0.243 | 0.047 |        |        |
| WEST-M   | UST Red   | 9.999   | 0.179 | 0.043 |        |        |
| WEST-T   | GAR Red   | 9.999   | 0.242 | 0.045 |        |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |                         |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|--------------------|
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.239/0.239, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.234/0.234, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.169/0.169, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.233/0.233, 1/1 | Watts: 0.046/0.046, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.168/0.168, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.236/0.236, 1/1 | Watts: 0.044/0.044, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.243/0.243, 1/1 | Watts: 0.047/0.047, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.179/0.179, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.242/0.242, 1/1 | Watts: 0.045/0.045, 1/1 | Cap (pF): */*, 1/1 |
| <b>FRANK™ Message</b> <p>1 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>2 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>3 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>4 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>5 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>6 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>7 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>8 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>9 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> |                      |                         |                    |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

1/21/2015 12:41:27 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |          |                         |               |
|--------------------------|-----------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 1/21/2015 | <b>Test Time:</b>            | 12:41 PM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 24°C      | <b>Apparatus Temperature</b> | 20°C     | <b>Humidity</b>         | 47 %          |
| <b>Tester</b>            | Garland   | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 2/10/2011     |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |          | <b>Reason</b>           |               |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |           | <b>Sheet #</b>               |          | <b>Crew Size</b>        | 3             |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| EAST -T  | N13764-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | N13764-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | N13764-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | N13765-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | N13765-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | N13765-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L89496-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L89496-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L89496-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 2159986  | General Electric | U    | 0.32   | 642    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

## Bushing Additional Details -H1

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H1      |             | Voltage Primary   |        | Serial # H24191   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

## Bushing Additional Details -H2

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H2      |             | Voltage Primary   |        | Serial # H24190   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps *</b>            | <b>BIL *</b>             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>       | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom *</b>          | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>             | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                             | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

### Overall Tests

|                                                     | Insulation        | Test kV | mA      | Watts | PF*TCF [%] | Corr Fctr | Cap (pF)  | FRANK™       | Manual |
|-----------------------------------------------------|-------------------|---------|---------|-------|------------|-----------|-----------|--------------|--------|
| 1                                                   | CH+CHL            | 10.003  | 170.384 | 5.498 | 0.323      | 1.000     | 45195.751 |              |        |
| 2                                                   | CH                | 10.002  | 37.042  | 1.689 | 0.456      | 1.000     | 9825.465  | Deteriorated |        |
| 3                                                   | CHL<br>(Measured) | 10.003  | 133.302 | 3.772 | 0.283      | 1.000     | 35359.550 | Good         |        |
| 4                                                   | CHL               | 0       | 133.342 | 3.809 | 0.286      | 1.000     | 35370.286 |              |        |
| 5                                                   | CL+CHL            | 10.006  | 253.636 | 9.447 | 0.373      | 1.000     | 67280.300 |              |        |
| 6                                                   | CL                | 10.003  | 120.381 | 5.655 | 0.470      | 1.000     | 31932.851 | Deteriorated |        |
| 7                                                   | CHL<br>(Measured) | 10.003  | 133.287 | 3.775 | 0.283      | 1.000     | 35354.951 |              |        |
| 8                                                   | CHL               | 0       | 133.255 | 3.793 | 0.285      | 1.000     | 35347.449 | Good         |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |         |       |            |           |           |              |        |
|                                                     | CH-C1             | CH'     | 30.926  | 1.452 | 0.470      | 1.000     | 8203.226  |              |        |
|                                                     | CL-C1             | CL'     | 120.381 | 5.655 | 0.470      | 1.000     | 31932.851 |              |        |

|            |                          |                         |                                    |
|------------|--------------------------|-------------------------|------------------------------------|
| <b>LSR</b> | mA: 170.384/170.384, 1/1 | Watts: 5.498/5.498, 1/1 | Cap (pF): 45195.751/45195.751, 1/1 |
| <b>LSR</b> | mA: 37.042/37.042, 1/1   | Watts: 1.689/1.689, 1/1 | Cap (pF): 9825.465/9825.465, 1/1   |
| <b>LSR</b> | mA: 133.302/133.302, 1/1 | Watts: 3.772/3.772, 1/1 | Cap (pF): 35359.550/35359.550, 1/1 |
| <b>LSR</b> | mA: 133.342/133.342, 1/1 | Watts: 3.809/3.809, 1/1 | Cap (pF): 35370.286/35370.286, 1/1 |
| <b>LSR</b> | mA: 253.636/253.636, 1/1 | Watts: 9.447/9.447, 1/1 | Cap (pF): 67280.300/67280.300, 1/1 |
| <b>LSR</b> | mA: 120.381/120.381, 1/1 | Watts: 5.655/5.655, 1/1 | Cap (pF): 31932.851/31932.851, 1/1 |
| <b>LSR</b> | mA: 133.287/133.287, 1/1 | Watts: 3.775/3.775, 1/1 | Cap (pF): 35354.951/35354.951, 1/1 |
| <b>LSR</b> | mA: 133.255/133.255, 1/1 | Watts: 3.793/3.793, 1/1 | Cap (pF): 35347.449/35347.449, 1/1 |
| <b>LSR</b> | mA: 30.926/30.926, 1/1   | Watts: 1.452/1.452, 1/1 | Cap (pF): 8203.226/8203.226, 1/1   |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1                 |



|                       |                                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| <b>FRANK™ Message</b> | 2 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.                                                                                                   |  |  |  |  |  |  |  |  |  |
|                       | For this transformer, the upper % power factor limit for a "G" rating is 0.4 and the upper % power factor limit before an "I" rating is 0.6                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |
|                       | The relative humidity is between 45 and 70 percent, a medium amount, which may cause some increases in watts and power factor ratings. Clean and dry the surfaces of bushings arresters, and other apparatus with insulators onto which may condense moisture from the air, before testing, using heat if necessary. |  |  |  |  |  |  |  |  |  |
|                       | 6 (Deteriorated) - The measured power factor is abnormally high for this type of apparatus, but compares to Previous and Initial tests. This is very unusual. Please contact Doble Engineering or your supervisor.                                                                                                   |  |  |  |  |  |  |  |  |  |

### Bushing Test (C1)

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™      | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|-------------|--------|
| H0 | 2159986  | 10.005  | 2.432 | 0.078 | 0.999     | 0.321      | 0.32   | 645.070  | 642    | Good        |        |
| H1 | H24191   | 10.003  | 1.231 | 0.039 | 1.044     | 0.331      | 0.52   | 326.435  | 334    | Investigate |        |
| H2 | H24190   | 10.008  | 1.236 | 0.052 | 1.044     | 0.437      | 0.48   | 327.830  | 334    | Good        |        |
| H3 | H24189   | 10.005  | 1.217 | 0.068 | 1.044     | 0.581      | 0.51   | 322.904  | 329    | Good        |        |

|            |                      |                         |                                |
|------------|----------------------|-------------------------|--------------------------------|
| <b>LSR</b> | mA: 2.432/2.432, 1/1 | Watts: 0.078/0.078, 1/1 | Cap (pF): 645.070/645.070, 1/1 |
| <b>LSR</b> | mA: 1.231/1.231, 1/1 | Watts: 0.039/0.039, 1/1 | Cap (pF): 326.435/326.435, 1/1 |
| <b>LSR</b> | mA: 1.236/1.236, 1/1 | Watts: 0.052/0.052, 1/1 | Cap (pF): 327.830/327.830, 1/1 |
| <b>LSR</b> | mA: 1.217/1.217, 1/1 | Watts: 0.068/0.068, 1/1 | Cap (pF): 322.904/322.904, 1/1 |

**FRANK™ Message** 2 (Investigate) - The C1 upper limit for a "G" rating is 0.5%

The C1 lower limit for a "G" rating is 0.1%

Power Factor is low compared to Nameplate.

Power Factor is low compared to the previous value.

### Bushing Test (C2)

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 2159986  | 0.499   | 1.933  | 0.062 | 1         | 0.319      | *      | 512.709  | *      | Good         |        |
| H1 | H24191   | 2.000   | 15.298 | 0.937 | 1         | 0.613      | *      | 4058.030 | *      | Deteriorated |        |
| H2 | H24190   | 2.000   | 14.992 | 0.875 | 1         | 0.584      | *      | 3976.755 | *      | Deteriorated |        |
| H3 | H24189   | 2.000   | 15.064 | 1.014 | 1         | 0.673      | *      | 3995.875 | *      | Deteriorated |        |

|            |                        |                         |                                  |
|------------|------------------------|-------------------------|----------------------------------|
| <b>LSR</b> | mA: 1.933/1.933, 1/1   | Watts: 0.062/0.062, 1/1 | Cap (pF): 512.709/512.709, 1/1   |
| <b>LSR</b> | mA: 15.298/15.298, 1/1 | Watts: 0.937/0.937, 1/1 | Cap (pF): 4058.030/4058.030, 1/1 |
| <b>LSR</b> | mA: 14.992/14.992, 1/1 | Watts: 0.875/0.875, 1/1 | Cap (pF): 3976.755/3976.755, 1/1 |
| <b>LSR</b> | mA: 15.064/15.064, 1/1 | Watts: 1.014/1.014, 1/1 | Cap (pF): 3995.875/3995.875, 1/1 |

**FRANK™ Message** 2 (Deteriorated) - The C2 upper limit for a "G" rating is 1.0%

The C2 lower limit for a "G" rating is 0.1%

Power Factor has increased since initial test.

3 (Deteriorated) - Power Factor has increased since initial test.

4 (Deteriorated) - Power Factor has increased since initial test.

## Hot Collar Tests

| ID | Serial # | Test Mode | Skirt # | Standard |       |       | Legacy (GST, optional) |       |       | FRANK™      | Manual |
|----|----------|-----------|---------|----------|-------|-------|------------------------|-------|-------|-------------|--------|
|    |          |           |         | Test kV  | mA    | Watts | Test kV                | mA    | Watts |             |        |
| X1 | 1730046  | UST RB    | 6       | 10.010   | 0.241 | 0.433 | *                      | 0.241 | *     | Bad         |        |
| X2 | 1730045  | UST RB    | 6       | 10.010   | 0.299 | 0.779 | *                      | 0.299 | *     | Bad         |        |
| X3 | 1730047  | UST RB    | 6       | 10.024   | 0.264 | 0.210 | *                      | 0.264 | *     | Investigate |        |
| H0 | 2159986  | UST RB    | 4       | *        | *     | *     | *                      | *     | *     |             |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                 |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------------|
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| <b>FRANK™ Message</b> <p>1 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.</p> <p>Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.</p> <p>2 (Bad) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.</p> <p>Watts losses extremely high. Check the surface for contamination and visually examine the bushing. Retest and recalculate. Contact supervisor or Doble if issue persists.</p> <p>3 (Investigate) - Current evaluation is based on the means of all currents at the same skirt. Recalculate result after testing at least three similar bushings.</p> <p>Watts losses are higher than expected. Check the surface for contamination and visually examine the bushing. Retest and recalculate. If test continues to read high, move to the next lowest skirt. Contact supervisor or Doble.</p> |              |                 |                    |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| EAST -T  | GAR Red   | 10.000  | 0.239 | 0.043 |        |        |
| EAST-B   | GAR Red   | 10.000  | 0.234 | 0.043 |        |        |
| EAST-M   | UST Red   | 10.000  | 0.169 | 0.041 |        |        |
| MID-B    | GAR Red   | 9.999   | 0.233 | 0.046 |        |        |
| MID-M    | UST Red   | 9.999   | 0.168 | 0.041 |        |        |
| MID-T    | GAR Red   | 9.999   | 0.236 | 0.044 |        |        |
| WEST-B   | GAR Red   | 10.000  | 0.243 | 0.047 |        |        |
| WEST-M   | UST Red   | 9.999   | 0.179 | 0.043 |        |        |
| WEST-T   | GAR Red   | 9.999   | 0.242 | 0.045 |        |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |                         |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|--------------------|
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.239/0.239, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.234/0.234, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.169/0.169, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.233/0.233, 1/1 | Watts: 0.046/0.046, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.168/0.168, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.236/0.236, 1/1 | Watts: 0.044/0.044, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.243/0.243, 1/1 | Watts: 0.047/0.047, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.179/0.179, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): */*, 1/1 |
| LSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | mA: 0.242/0.242, 1/1 | Watts: 0.045/0.045, 1/1 | Cap (pF): */*, 1/1 |
| <b>FRANK™ Message</b> <p>1 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>2 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>3 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>4 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>5 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>6 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>7 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>8 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> <p>9 (Unrated) - No limit file has been created for this apparatus based on the manufacturer, unit catalog #, and overall catalog # entered. Make sure all of this information is entered if available. Please email the file to your Doble engineer and a limit file will be created for you. In the absence of limits for this specific apparatus, other methods, such as comparison to previous data and comparison amongst other phases will be used to determine the condition of the insulation.</p> |                      |                         |                    |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

4/25/2012 10:54:54 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |          |                         |           |
|--------------------------|-----------|------------------------------|----------|-------------------------|-----------|
| <b>Test Date</b>         | 4/25/2012 | <b>Test Time:</b>            | 10:54 AM | <b>Weather</b>          | Sunny     |
| <b>Air Temperature</b>   | 24°C      | <b>Apparatus Temperature</b> | 21°C     | <b>Humidity</b>         | 0 %       |
| <b>Tester</b>            | ABSHER    | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 2/10/2011 |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |           |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |          | <b>Reason</b>           | Routine   |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |           |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |          | <b>Duration</b>         |           |
| <b>Copies</b>            |           | <b>Sheet #</b>               |          | <b>Crew Size</b>        | 4         |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| EAST -T  | L90767-T | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| EAST-M   | L90767-M | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| EAST-B   | L90767-B | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-T    | L90770-T | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| MID-M    | L90770-M | Ohio Brass   | 314144          |              | PVN  | 74       | 1     |
| MID-B    | L90770-B | Ohio Brass   | 314144          |              | PVN  | 70       | 1     |
| WEST-T   | L90773-T | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-M   | L90773-M | Ohio Brass   | 314144          |              | PVN  | *        | 1     |
| WEST-B   | L90773-B | Ohio Brass   | 314144          |              | PVN  | *        | 1     |

## Bushing Nameplate

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 2159986  | General Electric | U    | 0.32   | 642    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

## Bushing Additional Details -H1

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H1      |             | Voltage Primary   |        | Serial # H24191   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

## Bushing Additional Details -H2

|                     |             |                   |        |                   |                   |
|---------------------|-------------|-------------------|--------|-------------------|-------------------|
| Designation H2      |             | Voltage Primary   |        | Serial # H24190   |                   |
| Catalog #           | 4B07-T-9053 | Amps              | 1600 A | BIL               | 900 kV            |
| Class               |             | Year              | 1972   | Drawing           |                   |
| Style               |             | Other             |        | S.O. Number       |                   |
| Physical Dimensions |             |                   |        |                   |                   |
| Creep Distance *    |             | Overall Length *  |        | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |             | Recess Depth *    |        | Outer Seal Dia. * | Slot Size *       |
| Units               |             |                   |        |                   |                   |
| Flange Dimensions   |             |                   |        |                   |                   |
| To Bottom *         |             | # Bolts *         |        | Max. Diameters    | Draw Lead         |
| To Top *            |             | Bolt Size *       |        | Below Flange *    | Tube ID *         |
|                     |             | Circle Diameter * |        | Above Flange *    | To Pin *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> *   | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> *   | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *      | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *      | <b>To Pin</b> *          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

### Overall Tests

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10.004         | 170.29    | 5.841        | 0.336             | 0.978            | 45169.6         |               |               |
| 2                                                   | CH                | 10.003         | 36.989    | 1.641        | 0.434             | 0.978            | 9811.5          | Good          |               |
| 3                                                   | CHL<br>(Measured) | 10.003         | 133.3     | 4.107        | 0.301             | 0.978            | 35358.1         | Good          |               |
| 4                                                   | CHL               | 0              | 133.301   | 4.2          | 0.308             | 0.978            | 35358.1         | Good          |               |
| 5                                                   | CL+CHL            | 10.007         | 253.36    | 9.94         | 0.384             | 0.978            | 67205.2         |               |               |
| 6                                                   | CL                | 10.004         | 120.01    | 5.802        | 0.473             | 0.978            | 31832.3         | Good          |               |
| 7                                                   | CHL<br>(Measured) | 10.003         | 133.31    | 3.887        | 0.285             | 0.978            | 35359.9         | Good          |               |
| 8                                                   | CHL               | 0              | 133.35    | 4.138        | 0.304             | 0.978            | 35372.9         | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 30.862    | 1.364        | 0.432             | 0.978            | 8186.11         |               |               |
|                                                     | CL-C1             | CL'            | 120.01    | 5.802        | 0.473             | 0.978            | 31832.3         |               |               |

|            |                          |                         |                                |
|------------|--------------------------|-------------------------|--------------------------------|
| <b>LSR</b> | mA: 170.29/170.29, 1/1   | Watts: 5.841/5.841, 1/1 | Cap (pF): 45169.6/45169.6, 1/1 |
| <b>LSR</b> | mA: 36.989/36.989, 1/1   | Watts: 1.641/1.641, 1/1 | Cap (pF): 9811.5/9811.5, 1/1   |
| <b>LSR</b> | mA: 133.3/133.3, 1/1     | Watts: 4.107/4.107, 1/1 | Cap (pF): 35358.1/35358.1, 1/1 |
| <b>LSR</b> | mA: 133.301/133.301, 1/1 | Watts: 4.2/4.2, 1/1     | Cap (pF): 35358.1/35358.1, 1/1 |
| <b>LSR</b> | mA: 253.36/253.36, 1/1   | Watts: 9.94/9.94, 1/1   | Cap (pF): 67205.2/67205.2, 1/1 |
| <b>LSR</b> | mA: 120.01/120.01, 1/1   | Watts: 5.802/5.802, 1/1 | Cap (pF): 31832.3/31832.3, 1/1 |
| <b>LSR</b> | mA: 133.31/133.31, 1/1   | Watts: 3.887/3.887, 1/1 | Cap (pF): 35359.9/35359.9, 1/1 |
| <b>LSR</b> | mA: 133.35/133.35, 1/1   | Watts: 4.138/4.138, 1/1 | Cap (pF): 35372.9/35372.9, 1/1 |
| <b>LSR</b> | mA: 30.862/30.862, 1/1   | Watts: 1.364/1.364, 1/1 | Cap (pF): 8186.11/8186.11, 1/1 |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1             |



**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 2159986  | 10.005  | 2.435 | 0.085 | 0.999     | 0.349      | 0.32   | 645.9    | 642    | Good         |        |
| H1 | H24191   | 10.005  | 1.235 | 0.067 | 1.055     | 0.572      | 0.52   | 327.71   | 334    | Deteriorated |        |
| H2 | H24190   | 10.005  | 1.239 | 0.061 | 1.055     | 0.520      | 0.48   | 328.58   | 334    | Deteriorated |        |
| H3 | H24189   | 10.008  | 1.218 | 0.064 | 1.055     | 0.554      | 0.51   | 323.2    | 329    | Deteriorated |        |

|     |  |                      |  |  |                         |  |  |                              |  |  |
|-----|--|----------------------|--|--|-------------------------|--|--|------------------------------|--|--|
| LSR |  | mA: 1.235/1.235, 1/1 |  |  | Watts: 0.067/0.067, 1/1 |  |  | Cap (pF): 327.71/327.71, 1/1 |  |  |
| LSR |  | mA: 2.435/2.435, 1/1 |  |  | Watts: 0.085/0.085, 1/1 |  |  | Cap (pF): 645.9/645.9, 1/1   |  |  |
| LSR |  | mA: 1.218/1.218, 1/1 |  |  | Watts: 0.064/0.064, 1/1 |  |  | Cap (pF): 323.2/323.2, 1/1   |  |  |
| LSR |  | mA: 1.239/1.239, 1/1 |  |  | Watts: 0.061/0.061, 1/1 |  |  | Cap (pF): 328.58/328.58, 1/1 |  |  |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 2159986  | 0.5     | 1.935  | 0.055 | 1         | 0.284      | *      | 513.21   | *      | Good   |        |
| H1 | H24191   | 2       | 15.266 | 0.761 | 1         | 0.498      | *      | 4049.4   | *      | Good   |        |
| H2 | H24190   | 2       | 14.968 | 0.746 | 1         | 0.498      | *      | 3970.4   | *      | Good   |        |
| H3 | H24189   | 2       | 15.039 | 0.76  | 1         | 0.505      | *      | 3989.2   | *      | Good   |        |

|     |  |                        |  |  |                         |  |  |                              |  |  |
|-----|--|------------------------|--|--|-------------------------|--|--|------------------------------|--|--|
| LSR |  | mA: 15.266/15.266, 1/1 |  |  | Watts: 0.761/0.761, 1/1 |  |  | Cap (pF): 4049.4/4049.4, 1/1 |  |  |
| LSR |  | mA: 1.935/1.935, 1/1   |  |  | Watts: 0.055/0.055, 1/1 |  |  | Cap (pF): 513.21/513.21, 1/1 |  |  |
| LSR |  | mA: 15.039/15.039, 1/1 |  |  | Watts: 0.76/0.76, 1/1   |  |  | Cap (pF): 3989.2/3989.2, 1/1 |  |  |
| LSR |  | mA: 14.968/14.968, 1/1 |  |  | Watts: 0.746/0.746, 1/1 |  |  | Cap (pF): 3970.4/3970.4, 1/1 |  |  |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.011   | *  | *     | 10.011                 | *  | 0.025 | Good   |        |
| X2 | 1730045  | GND RB    | 6       | 10.01    | *  | *     | 10.01                  | *  | 0.042 | Good   |        |
| X3 | 1730047  | GND RB    | 6       | 10.025   | *  | *     | 10.025                 | *  | 0.046 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
| H0 | 2159986  | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |  |                 |  |  |                    |  |  |
|-----|--|--------------|--|--|-----------------|--|--|--------------------|--|--|
| LSR |  | mA: */*, 1/1 |  |  | Watts: */*, 1/1 |  |  | Cap (pF): */*, 1/1 |  |  |
| LSR |  | mA: */*, 1/1 |  |  | Watts: */*, 1/1 |  |  | Cap (pF): */*, 1/1 |  |  |
| LSR |  | mA: */*, 1/1 |  |  | Watts: */*, 1/1 |  |  | Cap (pF): */*, 1/1 |  |  |
| LSR |  | mA: */*, 1/1 |  |  | Watts: */*, 1/1 |  |  | Cap (pF): */*, 1/1 |  |  |
| LSR |  | mA: */*, 1/1 |  |  | Watts: */*, 1/1 |  |  | Cap (pF): */*, 1/1 |  |  |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| EAST -T  | GND RB    | 10.002  | 0.216 | 0.039 |        | Good   |
| EAST-B   | GND RB    | 10.001  | 0.285 | 0.042 |        | Good   |
| EAST-M   | GND RB    | 10.002  | 0.26  | 0.042 |        | Good   |
| MID-B    | GND RB    | 10.002  | 0.285 | 0.045 |        | Good   |
| MID-M    | GND RB    | 10.002  | 0.26  | 0.041 |        | Good   |
| MID-T    | GND RB    | 10.002  | 0.22  | 0.036 |        | Good   |
| WEST-B   | GND RB    | 10.002  | 0.289 | 0.048 |        | Good   |
| WEST-M   | GND RB    | 10.002  | 0.263 | 0.043 |        | Good   |
| WEST-T   | GND RB    | 10.003  | 0.217 | 0.039 |        | Good   |

|            |                      |                         |                              |
|------------|----------------------|-------------------------|------------------------------|
| <b>LSR</b> | mA: 0.216/0.216, 1/1 | Watts: 0.039/0.039, 1/1 | Cap (pF): 57.162/57.162, 1/1 |
| <b>LSR</b> | mA: 0.285/0.285, 1/1 | Watts: 0.042/0.042, 1/1 | Cap (pF): 75.474/75.474, 1/1 |
| <b>LSR</b> | mA: 0.26/0.26, 1/1   | Watts: 0.042/0.042, 1/1 | Cap (pF): 69.024/69.024, 1/1 |
| <b>LSR</b> | mA: 0.285/0.285, 1/1 | Watts: 0.045/0.045, 1/1 | Cap (pF): 75.537/75.537, 1/1 |
| <b>LSR</b> | mA: 0.26/0.26, 1/1   | Watts: 0.041/0.041, 1/1 | Cap (pF): 68.993/68.993, 1/1 |
| <b>LSR</b> | mA: 0.22/0.22, 1/1   | Watts: 0.036/0.036, 1/1 | Cap (pF): 58.454/58.454, 1/1 |
| <b>LSR</b> | mA: 0.289/0.289, 1/1 | Watts: 0.048/0.048, 1/1 | Cap (pF): 76.564/76.564, 1/1 |
| <b>LSR</b> | mA: 0.263/0.263, 1/1 | Watts: 0.043/0.043, 1/1 | Cap (pF): 69.631/69.631, 1/1 |
| <b>LSR</b> | mA: 0.217/0.217, 1/1 | Watts: 0.039/0.039, 1/1 | Cap (pF): 57.506/57.506, 1/1 |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

2/10/2011 1:11:52 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |         |                         |          |
|--------------------------|-----------|------------------------------|---------|-------------------------|----------|
| <b>Test Date</b>         | 2/10/2011 | <b>Test Time:</b>            | 1:11 PM | <b>Weather</b>          | Cloudy   |
| <b>Air Temperature</b>   | 12°C      | <b>Apparatus Temperature</b> | 22°C    | <b>Humidity</b>         | 82 %     |
| <b>Tester</b>            | DUKES     | <b>Work Order</b>            |         | <b>Date Last Tested</b> | 2/8/2011 |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100   | <b>Date Retested</b>    |          |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |         | <b>Reason</b>           | Trouble  |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100   | <b>Travel Time</b>      |          |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |         | <b>Duration</b>         |          |
| <b>Copies</b>            |           | <b>Sheet #</b>               |         | <b>Crew Size</b>        | 4        |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 2159986  | General Electric | U    | 0.32   | 642    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                     |         |                   |           |                   |                   |
|---------------------|---------|-------------------|-----------|-------------------|-------------------|
| Designation         | X3      | Voltage           | Secondary | Serial #          | 1621228           |
| Catalog #           | 1B564G3 | Amps              | 2000 A    | BIL               | 150 kV            |
| Class               |         | Year              | 1982      | Drawing           |                   |
| Style               |         | Other             |           | S.O. Number       |                   |
| Physical Dimensions |         |                   |           |                   |                   |
| Creep Distance *    |         | Overall Length *  |           | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |         | Recess Depth *    |           | Outer Seal Dia. * | Slot Size *       |
| Units               |         |                   |           |                   |                   |
| Flange Dimensions   |         |                   |           |                   |                   |
| To Bottom *         |         | # Bolts *         |           | Max. Diameters    | Draw Lead         |
| To Top *            |         | Bolt Size *       |           | Below Flange *    | Tube ID *         |
|                     |         | Circle Diameter * |           | Above Flange *    | To Pin *          |

## Overall Tests

|                                              | Insulation        | Test kV | mA      | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|----------------------------------------------|-------------------|---------|---------|-------|------------|-----------|----------|--------|--------|
| 1                                            | CH+CHL            | 10.011  | 170.57  | 5.242 | 0.294      | 0.957     | 45243.5  |        |        |
| 2                                            | CH                | 10.006  | 36.959  | 1.427 | 0.369      | 0.957     | 9803.6   | Good   |        |
| 3                                            | CHL<br>(Measured) | 10.005  | 133.51  | 3.759 | 0.269      | 0.957     | 35412.9  | Good   |        |
| 4                                            | CHL               | 0       | 133.611 | 3.815 | 0.273      | 0.957     | 35439.9  | Good   |        |
| 5                                            | CL+CHL            | 10.019  | 253.94  | 9.531 | 0.359      | 0.957     | 67359    |        |        |
| 6                                            | CL                | 10.006  | 120.45  | 5.884 | 0.467      | 0.957     | 31950.2  | Good   |        |
| 7                                            | CHL<br>(Measured) | 10.006  | 133.51  | 3.813 | 0.273      | 0.957     | 35414.2  | Good   |        |
| 8                                            | CHL               | 0       | 133.49  | 3.647 | 0.261      | 0.957     | 35408.8  | Good   |        |
| Winding without Attached Bushing Calculation |                   |         |         |       |            |           |          |        |        |
|                                              | CH-C1             | CH'     | 36.959  | 1.427 | 0.369      | 0.957     | 9803.6   |        |        |
|                                              | CL-C1             | CL'     | 120.45  | 5.884 | 0.467      | 0.957     | 31950.2  |        |        |

|     |                          |                         |                                |
|-----|--------------------------|-------------------------|--------------------------------|
| LSR | mA: 170.57/170.57, 1/1   | Watts: 5.242/5.242, 1/1 | Cap (pF): 45243.5/45243.5, 1/1 |
| LSR | mA: 36.959/36.959, 1/1   | Watts: 1.427/1.427, 1/1 | Cap (pF): 9803.6/9803.6, 1/1   |
| LSR | mA: 133.51/133.51, 1/1   | Watts: 3.759/3.759, 1/1 | Cap (pF): 35412.9/35412.9, 1/1 |
| LSR | mA: 133.611/133.611, 1/1 | Watts: 3.815/3.815, 1/1 | Cap (pF): 35439.9/35439.9, 1/1 |
| LSR | mA: 253.94/253.94, 1/1   | Watts: 9.531/9.531, 1/1 | Cap (pF): 67359/67359, 1/1     |
| LSR | mA: 120.45/120.45, 1/1   | Watts: 5.884/5.884, 1/1 | Cap (pF): 31950.2/31950.2, 1/1 |
| LSR | mA: 133.51/133.51, 1/1   | Watts: 3.813/3.813, 1/1 | Cap (pF): 35414.2/35414.2, 1/1 |
| LSR | mA: 133.49/133.49, 1/1   | Watts: 3.647/3.647, 1/1 | Cap (pF): 35408.8/35408.8, 1/1 |
| LSR | mA: */*, */*             | Watts: */*, */*         | Cap (pF): */*, */*             |
| LSR | mA: */*, 1/1             | Watts: */*, 1/1         | Cap (pF): */*, 1/1             |

## Bushing Test (C1)

| ID | Serial # | Test kV | mA   | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™      | Manual |
|----|----------|---------|------|-------|-----------|------------|--------|----------|--------|-------------|--------|
| H0 | 2159986  | 10.008  | 2.42 | 0.069 | 1         | 0.290      | 0.32   | 641.99   | 642    | Investigate | Good   |

|     |                    |                         |                               |
|-----|--------------------|-------------------------|-------------------------------|
| LSR | mA: 2.42/2.42, 1/1 | Watts: 0.069/0.069, 1/1 | Cap (pF): 641.99/641.986, 1/1 |
|-----|--------------------|-------------------------|-------------------------------|

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 2159986  | 0.5     | 1.939 | 0.079 | 1         | 0.410      | *      | 514.26   | *      | Deteriorated | Good   |

|     |                      |                         |                               |
|-----|----------------------|-------------------------|-------------------------------|
| LSR | mA: 1.939/1.939, 1/1 | Watts: 0.079/0.079, 1/1 | Cap (pF): 514.26/514.258, 1/1 |
|-----|----------------------|-------------------------|-------------------------------|

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.009   | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10.009   | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10.022   | *  | *     | 10.022                 | *  | 0.088 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
| H0 | 2159986  | GND RB    | 4       | 10.022   | *  | *     | 10.022                 | *  | 0.039 | Good   |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10.03   | 0.286 | 0.139 | Good   |        |
| BOT E    | GND RB    | 10.013  | 0.297 | 0.065 | Good   |        |
| TOP M    | GND RB    | 10.015  | 0.277 | 0.071 | Good   |        |
| BOT M    | GND RB    | 10.015  | 0.297 | 0.057 | Good   |        |
| TOP W    | GND RB    | 10.017  | 0.276 | 0.041 | Good   |        |
| MID-B    | GND RB    | 10.015  | 0.295 | 0.049 | Good   |        |

|     |                      |                         |                              |
|-----|----------------------|-------------------------|------------------------------|
| LSR | mA: 0.286/0.286, 1/1 | Watts: 0.139/0.139, 1/1 | Cap (pF): 75.727/75.727, 1/1 |
| LSR | mA: 0.297/0.297, 1/1 | Watts: 0.065/0.065, 1/1 | Cap (pF): 78.834/78.834, 1/1 |
| LSR | mA: 0.277/0.277, 1/1 | Watts: 0.071/0.071, 1/1 | Cap (pF): 73.572/73.572, 1/1 |
| LSR | mA: 0.297/0.297, 1/1 | Watts: 0.057/0.057, 1/1 | Cap (pF): 78.811/78.811, 1/1 |
| LSR | mA: 0.276/0.276, 1/1 | Watts: 0.041/0.041, 1/1 | Cap (pF): 73.116/73.116, 1/1 |
| LSR | mA: 0.295/0.295, 1/1 | Watts: 0.049/0.049, 1/1 | Cap (pF): 78.333/78.333, 1/1 |



**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

2/8/2011 11:00:35 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |          |                              |          |                         |           |
|--------------------------|----------|------------------------------|----------|-------------------------|-----------|
| <b>Test Date</b>         | 2/8/2011 | <b>Test Time:</b>            | 11:00 AM | <b>Weather</b>          | Cloudy    |
| <b>Air Temperature</b>   | 13°C     | <b>Apparatus Temperature</b> | 25°C     | <b>Humidity</b>         | 59 %      |
| <b>Tester</b>            |          | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 3/31/2009 |
| <b>Verified</b>          |          | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |           |
| <b>Verification Date</b> |          | <b>Set Top Serial #</b>      |          | <b>Reason</b>           | Trouble   |
| <b>Last Sheet #</b>      |          | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |           |
| <b>Purchase Order</b>    |          | <b>Ins. Book #</b>           |          | <b>Duration</b>         |           |
| <b>Copies</b>            |          | <b>Sheet #</b>               |          | <b>Crew Size</b>        |           |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| HC2         | HC-SN-1  | OTHER            |      | *      | *      | *      | *      | *        | *    |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X3**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Overall Tests**

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10.01          | 170.67    | 13.732       | 0.721             | 0.896            | 45270.2         |               |               |
| 2                                                   | CH                | 10.005         | 37.193    | 10.513       | 2.531             | 0.896            | 9861.7          | Bad           |               |
| 3                                                   | CHL<br>(Measured) | 10.005         | 133.39    | 3.525        | 0.237             | 0.896            | 35381.2         | Good          |               |
| 4                                                   | CHL               | 0              | 133.477   | 3.219        | 0.216             | 0.896            | 35408.5         | Good          |               |
| 5                                                   | CL+CHL            | 10.01          | 253.87    | 8.696        | 0.307             | 0.896            | 67339.3         |               |               |
| 6                                                   | CL                | 10.006         | 120.49    | 5.427        | 0.403             | 0.896            | 31961.7         | Good          |               |
| 7                                                   | CHL<br>(Measured) | 10.006         | 133.4     | 3.57         | 0.240             | 0.896            | 35384.4         | Good          |               |
| 8                                                   | CHL               | 0              | 133.38    | 3.269        | 0.219             | 0.896            | 35377.6         | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 30.892    | 9.223        | 2.674             | 0.896            | 8190.87         |               |               |
|                                                     | CL-C1             | CL'            | 120.49    | 5.427        | 0.403             | 0.896            | 31961.7         |               |               |

|            |                          |                           |                                |
|------------|--------------------------|---------------------------|--------------------------------|
| <b>LSR</b> | mA: 170.67/170.67, 1/1   | Watts: 13.732/13.732, 1/1 | Cap (pF): 45270.2/45270.2, 1/1 |
| <b>LSR</b> | mA: 37.193/37.193, 1/1   | Watts: 10.513/10.513, 1/1 | Cap (pF): 9861.7/9861.7, 1/1   |
| <b>LSR</b> | mA: 133.39/133.39, 1/1   | Watts: 3.525/3.525, 1/1   | Cap (pF): 35381.2/35381.2, 1/1 |
| <b>LSR</b> | mA: 133.477/133.477, 1/1 | Watts: 3.219/3.219, 1/1   | Cap (pF): 35408.5/35408.5, 1/1 |
| <b>LSR</b> | mA: 253.87/253.87, 1/1   | Watts: 8.696/8.696, 1/1   | Cap (pF): 67339.3/67339.3, 1/1 |
| <b>LSR</b> | mA: 120.49/120.49, 1/1   | Watts: 5.427/5.427, 1/1   | Cap (pF): 31961.7/31961.7, 1/1 |
| <b>LSR</b> | mA: 133.4/133.4, 1/1     | Watts: 3.57/3.57, 1/1     | Cap (pF): 35384.4/35384.4, 1/1 |
| <b>LSR</b> | mA: 133.38/133.38, 1/1   | Watts: 3.269/3.269, 1/1   | Cap (pF): 35377.6/35377.6, 1/1 |
| <b>LSR</b> | mA: 30.892/30.892, 1/1   | Watts: 9.223/9.223, 1/1   | Cap (pF): 8190.87/8190.87, 1/1 |
| <b>LSR</b> | mA: */*, 1/1             | Watts: */*, 1/1           | Cap (pF): */*, 1/1             |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10.036  | 2.598 | 1.146 | 1         | 4.410      | 0.36   | 688.52   | 662    | Bad    |        |
| H1 | H24191   | 10.009  | 1.239 | 0.052 | 0.96      | 0.400      | 0.52   | 328.7    | 334    | Good   |        |
| H2 | H24190   | 10.009  | 1.243 | 0.044 | 0.98      | 0.340      | 0.48   | 329.65   | 334    | Good   |        |
| H3 | H24189   | 10.009  | 1.221 | 0.048 | 0.98      | 0.380      | 0.51   | 323.96   | 329    | Good   |        |

|     |  |                      |  |                         |  |                               |  |
|-----|--|----------------------|--|-------------------------|--|-------------------------------|--|
| LSR |  | mA: 1.239/1.239, 1/1 |  | Watts: 0.052/0.052, 1/1 |  | Cap (pF): 328.7/328.698, 1/1  |  |
| LSR |  | mA: 2.598/2.598, 1/1 |  | Watts: 1.146/1.146, 1/1 |  | Cap (pF): 688.52/688.523, 1/1 |  |
| LSR |  | mA: 1.221/1.221, 1/1 |  | Watts: 0.048/0.048, 1/1 |  | Cap (pF): 323.96/323.955, 1/1 |  |
| LSR |  | mA: 1.243/1.243, 1/1 |  | Watts: 0.044/0.044, 1/1 |  | Cap (pF): 329.65/329.647, 1/1 |  |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™      | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|-------------|--------|
| H0 | 1721689  | 0.499   | 1.953  | 1.421 | 1         | 7.280      | *      | 516.62   | *      | Investigate |        |
| H1 | H24191   | 2       | 15.321 | 0.898 | 1         | 0.590      | *      | 4063.8   | *      | Good        |        |
| H2 | H24190   | 2       | 15.024 | 0.657 | 1         | 0.440      | *      | 3985.1   | *      | Good        |        |
| H3 | H24189   | 2       | 15.094 | 0.892 | 1         | 0.590      | *      | 4003.8   | *      | Good        |        |

|     |  |                        |  |                         |  |                                |  |
|-----|--|------------------------|--|-------------------------|--|--------------------------------|--|
| LSR |  | mA: 15.321/15.321, 1/1 |  | Watts: 0.898/0.898, 1/1 |  | Cap (pF): 4063.8/4063.814, 1/1 |  |
| LSR |  | mA: 1.953/1.953, 1/1   |  | Watts: 1.421/1.421, 1/1 |  | Cap (pF): 516.62/516.617, 1/1  |  |
| LSR |  | mA: 15.094/15.094, 1/1 |  | Watts: 0.892/0.892, 1/1 |  | Cap (pF): 4003.8/4003.804, 1/1 |  |
| LSR |  | mA: 15.024/15.024, 1/1 |  | Watts: 0.657/0.657, 1/1 |  | Cap (pF): 3985.1/3985.125, 1/1 |  |

**Hot Collar Tests**

| ID   | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™      | Manual |
|------|----------|-----------|---------|----------|----|-------|------------------------|----|-------|-------------|--------|
|      |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |             |        |
| X1   | 1730046  | GND RB    | 6       | 10.009   | *  | *     | 10.009                 | *  | 0.041 | Good        |        |
| X2   | 1730045  | GND RB    | 6       | 10.009   | *  | *     | 10.009                 | *  | 0.078 | Good        |        |
| X3   | 1730047  | GND RB    | 6       | 10.016   | *  | *     | 10.016                 | *  | 0.136 | Investigate |        |
| HC 2 | HC-SN-1  | GND RB    | 4       | 10.008   | *  | *     | 10.008                 | *  | 0.016 | Good        |        |
|      |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |             |        |

|     |  |              |  |                 |  |                    |  |
|-----|--|--------------|--|-----------------|--|--------------------|--|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |

**Core Ground Test**

| Voltage | * | Resistance | * |
|---------|---|------------|---|
|---------|---|------------|---|

Surge Arrester Tests

| Location | Test Mode | Test kV | mA | Watts | FRANK™ | Manual |
|----------|-----------|---------|----|-------|--------|--------|
| TOP E    | GND RB    | 10.008  | *  | *     |        |        |
| BOT E    | GND RB    | 10.007  | *  | *     |        |        |
| TOP M    | GND RB    | 10.008  | *  | *     |        |        |
| BOT M    | GND RB    | 10.008  | *  | *     |        |        |
| TOP W    | GND RB    | 10.011  | *  | *     |        |        |
| MID-B    | GND RB    | 10.008  | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

3/31/2009 8:21:42 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |         |                         |               |
|--------------------------|-----------|------------------------------|---------|-------------------------|---------------|
| <b>Test Date</b>         | 3/31/2009 | <b>Test Time:</b>            | 8:21 AM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 21°C      | <b>Apparatus Temperature</b> | 40°C    | <b>Humidity</b>         | 85 %          |
| <b>Tester</b>            | RAULERSON | <b>Work Order</b>            |         | <b>Date Last Tested</b> | 3/30/2009     |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100   | <b>Date Retested</b>    |               |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |         | <b>Reason</b>           | Trouble       |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100   | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |         | <b>Duration</b>         |               |
| <b>Copies</b>            |           | <b>Sheet #</b>               |         | <b>Crew Size</b>        |               |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |



**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                     |         |                   |           |                   |                   |
|---------------------|---------|-------------------|-----------|-------------------|-------------------|
| Designation         | X3      | Voltage           | Secondary | Serial #          | 1621228           |
| Catalog #           | 1B564G3 | Amps              | 2000 A    | BIL               | 150 kV            |
| Class               |         | Year              | 1982      | Drawing           |                   |
| Style               |         | Other             |           | S.O. Number       |                   |
| Physical Dimensions |         |                   |           |                   |                   |
| Creep Distance *    |         | Overall Length *  |           | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |         | Recess Depth *    |           | Outer Seal Dia. * | Slot Size *       |
| Units               |         |                   |           |                   |                   |
| Flange Dimensions   |         |                   |           |                   |                   |
| To Bottom *         |         | # Bolts *         |           | Max. Diameters    | Draw Lead         |
| To Top *            |         | Bolt Size *       |           | Below Flange *    | Tube ID *         |
|                     |         | Circle Diameter * |           | Above Flange *    | To Pin *          |

## Overall Tests

|                                              | Insulation        | Test kV | mA      | Watts  | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|----------------------------------------------|-------------------|---------|---------|--------|------------|-----------|----------|--------|--------|
| 1                                            | CH+CHL            | 10.01   | 171.65  | 6.632  | 0.248      | 0.643     | 45530.5  |        |        |
| 2                                            | CH                | 10.005  | 37.093  | 2.271  | 0.394      | 0.643     | 9839     | Good   |        |
| 3                                            | CHL<br>(Measured) | 10.005  | 134.45  | 4.319  | 0.207      | 0.643     | 35664.2  | Good   |        |
| 4                                            | CHL               | 0       | 134.557 | 4.361  | 0.208      | 0.643     | 35691.5  | Good   |        |
| 5                                            | CL+CHL            | 10.009  | 253.79  | 12.569 | 0.318      | 0.643     | 67319.9  |        |        |
| 6                                            | CL                | 10.005  | 119.35  | 8.09   | 0.436      | 0.643     | 31659    | Good   |        |
| 7                                            | CHL<br>(Measured) | 10.005  | 134.45  | 4.265  | 0.204      | 0.643     | 35663.5  | Good   |        |
| 8                                            | CHL               | 0       | 134.44  | 4.479  | 0.214      | 0.643     | 35660.9  | Good   |        |
| Winding without Attached Bushing Calculation |                   |         |         |        |            |           |          |        |        |
|                                              | CH-C1             | CH'     | 37.093  | 2.271  | 0.394      | 0.643     | 9839     |        |        |
|                                              | CL-C1             | CL'     | 119.35  | 8.09   | 0.436      | 0.643     | 31659    |        |        |

|     |                          |                           |                                |
|-----|--------------------------|---------------------------|--------------------------------|
| LSR | mA: 171.65/171.65, 1/1   | Watts: 6.632/6.632, 1/1   | Cap (pF): 45530.5/45530.5, 1/1 |
| LSR | mA: 37.093/37.093, 1/1   | Watts: 2.271/2.271, 1/1   | Cap (pF): 9839/9839, 1/1       |
| LSR | mA: 134.45/134.45, 1/1   | Watts: 4.319/4.319, 1/1   | Cap (pF): 35664.2/35664.2, 1/1 |
| LSR | mA: 134.557/134.557, 1/1 | Watts: 4.361/4.361, 1/1   | Cap (pF): 35691.5/35691.5, 1/1 |
| LSR | mA: 253.79/253.79, 1/1   | Watts: 12.569/12.569, 1/1 | Cap (pF): 67319.9/67319.9, 1/1 |
| LSR | mA: 119.35/119.35, 1/1   | Watts: 8.09/8.09, 1/1     | Cap (pF): 31659/31659, 1/1     |
| LSR | mA: 134.45/134.45, 1/1   | Watts: 4.265/4.265, 1/1   | Cap (pF): 35663.5/35663.5, 1/1 |
| LSR | mA: 134.44/134.44, 1/1   | Watts: 4.479/4.479, 1/1   | Cap (pF): 35660.9/35660.9, 1/1 |
| LSR | mA: */*, */*             | Watts: */*, */*           | Cap (pF): */*, */*             |
| LSR | mA: */*, */*             | Watts: */*, */*           | Cap (pF): */*, */*             |

## Hot Collar Tests

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA | Watts | FRANK™ | Manual |
|----------|-----------|---------|----|-------|--------|--------|
| TOP E    | GND RB    | 10.008  | *  | *     |        |        |
| BOT E    | GND RB    | 10.007  | *  | *     |        |        |
| TOP M    | GND RB    | 10.008  | *  | *     |        |        |
| BOT M    | GND RB    | 10.008  | *  | *     |        |        |
| TOP W    | GND RB    | 10.011  | *  | *     |        |        |
| MID-B    | GND RB    | 10.008  | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

3/30/2009 9:16:54 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |                 |                         |               |
|--------------------------|-----------|------------------------------|-----------------|-------------------------|---------------|
| <b>Test Date</b>         | 3/30/2009 | <b>Test Time:</b>            | 9:16 AM         | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 28°C      | <b>Apparatus Temperature</b> | 60°C            | <b>Humidity</b>         | 31 %          |
| <b>Tester</b>            | RAULERSON | <b>Work Order</b>            | 2009-2990063090 | <b>Date Last Tested</b> | 3/22/2009     |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100           | <b>Date Retested</b>    |               |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |                 | <b>Reason</b>           | Trouble       |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100           | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |                 | <b>Duration</b>         |               |
| <b>Copies</b>            |           | <b>Sheet #</b>               |                 | <b>Crew Size</b>        | 4             |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |



### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA      | Watts  | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™       | Manual |
|-----------------------------------------------------|-------------------|---------|---------|--------|------------|-----------|----------|--------------|--------|
| 1                                                   | CH+CHL            | 10.01   | 171.63  | 9.39   | 0.230      | 0.41      | 45524.5  |              |        |
| 2                                                   | CH                | 10.006  | 37.147  | 3.16   | 0.350      | 0.41      | 9853.1   | Deteriorated |        |
| 3                                                   | CHL<br>(Measured) | 10.005  | 134.38  | 6.173  | 0.190      | 0.41      | 35644.3  | Good         |        |
| 4                                                   | CHL               | *       | 134.483 | 6.23   | 0.190      | 0.41      | 35671.4  | Good         |        |
| 5                                                   | CL+CHL            | 10.011  | 253.68  | 14.088 | 0.230      | 0.41      | 67290.7  |              |        |
| 6                                                   | CL                | 10.006  | 119.34  | 7.851  | 0.270      | 0.41      | 31654.9  | Good         |        |
| 7                                                   | CHL<br>(Measured) | 10.006  | 134.38  | 6.141  | 0.190      | 0.41      | 35645.4  | Good         |        |
| 8                                                   | CHL               | *       | 134.34  | 6.237  | 0.190      | 0.41      | 35635.8  | Good         |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |         |        |            |           |          |              |        |
|                                                     | CH-C1             | CH'     | 30.916  | 2.958  | 0.390      | 0.41      | 8200.18  |              |        |
|                                                     | CL-C1             | CL'     | 119.34  | 7.851  | 0.270      | 0.41      | 31654.9  |              |        |

|            |                         |                           |                                 |
|------------|-------------------------|---------------------------|---------------------------------|
| <b>LSR</b> | mA: 171.63/171.627, 1/1 | Watts: 9.39/9.39, 1/1     | Cap (pF): 45524.5/45524.5, 1/1  |
| <b>LSR</b> | mA: 37.147/37.147, 1/1  | Watts: 3.16/3.16, 1/1     | Cap (pF): 9853.1/9853.133, 1/1  |
| <b>LSR</b> | mA: 134.38/134.379, 1/1 | Watts: 6.173/6.173, 1/1   | Cap (pF): 35644.3/35644.26, 1/1 |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: 253.68/253.683, 1/1 | Watts: 14.088/14.088, 1/1 | Cap (pF): 67290.7/67290.66, 1/1 |
| <b>LSR</b> | mA: 119.34/119.339, 1/1 | Watts: 7.851/7.851, 1/1   | Cap (pF): 31654.9/31654.88, 1/1 |
| <b>LSR</b> | mA: 134.38/134.382, 1/1 | Watts: 6.141/6.141, 1/1   | Cap (pF): 35645.4/35645.38, 1/1 |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10.008  | 2.517 | 0.083 | 0.99      | 0.330      | 0.36   | 667.75   | 662    | Good   |        |
| H1 | H24191   | 10.009  | 1.243 | 0.046 | 1.2       | 0.440      | 0.52   | 329.7    | 334    | Good   |        |
| H2 | H24190   | 10.009  | 1.245 | 0.033 | 1.2       | 0.320      | 0.48   | 330.24   | 334    | Good   |        |
| H3 | H24189   | 10.01   | 1.226 | 0.04  | 1.2       | 0.400      | 0.51   | 325.23   | 329    | Good   |        |

|     |  |                      |  |                         |  |                               |
|-----|--|----------------------|--|-------------------------|--|-------------------------------|
| LSR |  | mA: 1.243/1.243, 1/1 |  | Watts: 0.046/0.046, 1/1 |  | Cap (pF): 329.7/329.696, 1/1  |
| LSR |  | mA: 1.245/1.245, 1/1 |  | Watts: 0.033/0.033, 1/1 |  | Cap (pF): 330.24/330.243, 1/1 |
| LSR |  | mA: 1.226/1.226, 1/1 |  | Watts: 0.04/0.04, 1/1   |  | Cap (pF): 325.23/325.226, 1/1 |
| LSR |  | mA: 2.517/2.517, 1/1 |  | Watts: 0.083/0.083, 1/1 |  | Cap (pF): 667.75/667.748, 1/1 |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™      | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|-------------|--------|
| H0 | 1721689  | 0.5     | 1.89   | 1.001 | 1         | 5.300      | *      | 500.55   | *      | Investigate |        |
| H1 | H24191   | 2       | 15.378 | 1.07  | 1         | 0.700      | *      | 4078.9   | *      | Good        |        |
| H2 | H24190   | 2       | 15.072 | 0.926 | 1         | 0.610      | *      | 3997.9   | *      | Good        |        |
| H3 | H24189   | 2       | 15.15  | 0.78  | 1         | 0.510      | *      | 4018.6   | *      | Good        |        |

|     |  |                        |  |                         |  |                                |
|-----|--|------------------------|--|-------------------------|--|--------------------------------|
| LSR |  | mA: 15.378/15.378, 1/1 |  | Watts: 1.07/1.07, 1/1   |  | Cap (pF): 4078.9/4078.941, 1/1 |
| LSR |  | mA: 15.072/15.072, 1/1 |  | Watts: 0.926/0.926, 1/1 |  | Cap (pF): 3997.9/3997.949, 1/1 |
| LSR |  | mA: 15.15/15.15, 1/1   |  | Watts: 0.78/0.78, 1/1   |  | Cap (pF): 4018.6/4018.571, 1/1 |
| LSR |  | mA: 1.89/1.89, 1/1     |  | Watts: 1.001/1.001, 1/1 |  | Cap (pF): 500.55/500.554, 1/1  |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10.008  | 0.283 | 0.067 | Good   |        |
| BOT E    | GND RB    | 10.007  | 0.298 | 0.053 | Good   |        |
| TOP M    | GND RB    | 10.008  | 0.28  | 0.051 | Good   |        |
| BOT M    | GND RB    | 10.008  | 0.301 | 0.056 | Good   |        |
| TOP W    | GND RB    | 10.011  | 0.278 | 0.044 | Good   |        |
| MID-B    | GND RB    | 10.008  | 0.301 | 0.057 | Good   |        |

|            |                      |                         |                              |
|------------|----------------------|-------------------------|------------------------------|
| <b>LSR</b> | mA: 0.283/0.283, 1/1 | Watts: 0.067/0.067, 1/1 | Cap (pF): 74.969/74.969, 1/1 |
| <b>LSR</b> | mA: 0.298/0.298, 1/1 | Watts: 0.053/0.053, 1/1 | Cap (pF): 79.133/79.133, 1/1 |
| <b>LSR</b> | mA: 0.28/0.28, 1/1   | Watts: 0.051/0.051, 1/1 | Cap (pF): 74.207/74.207, 1/1 |
| <b>LSR</b> | mA: 0.301/0.301, 1/1 | Watts: 0.056/0.056, 1/1 | Cap (pF): 79.918/79.918, 1/1 |
| <b>LSR</b> | mA: 0.278/0.278, 1/1 | Watts: 0.044/0.044, 1/1 | Cap (pF): 73.731/73.731, 1/1 |
| <b>LSR</b> | mA: 0.301/0.301, 1/1 | Watts: 0.057/0.057, 1/1 | Cap (pF): 79.858/79.858, 1/1 |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

3/22/2009 8:27:34 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |         |                         |           |
|--------------------------|-----------|------------------------------|---------|-------------------------|-----------|
| <b>Test Date</b>         | 3/22/2009 | <b>Test Time:</b>            | 8:27 AM | <b>Weather</b>          | Sunny     |
| <b>Air Temperature</b>   | 14°C      | <b>Apparatus Temperature</b> | 25°C    | <b>Humidity</b>         | 73 %      |
| <b>Tester</b>            |           | <b>Work Order</b>            |         | <b>Date Last Tested</b> | 3/20/2009 |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100   | <b>Date Retested</b>    |           |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |         | <b>Reason</b>           |           |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100   | <b>Travel Time</b>      |           |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |         | <b>Duration</b>         |           |
| <b>Copies</b>            |           | <b>Sheet #</b>               |         | <b>Crew Size</b>        |           |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |



## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA      | Watts  | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™       | Manual |
|-----------------------------------------------------|-------------------|---------|---------|--------|------------|-----------|----------|--------------|--------|
| 1                                                   | CH+CHL            | 10.009  | 171.73  | 8.001  | 0.420      | 0.9       | 45551.5  |              |        |
| 2                                                   | CH                | 10.005  | 37.087  | 3.921  | 0.950      | 0.9       | 9837.1   | Investigate  |        |
| 3                                                   | CHL<br>(Measured) | 10.005  | 134.54  | 4.019  | 0.270      | 0.9       | 35687.3  | Good         |        |
| 4                                                   | CHL               | *       | 134.643 | 4.08   | 0.270      | 0.9       | 35714.4  | Good         |        |
| 5                                                   | CL+CHL            | 10.011  | 253.83  | 10.824 | 0.390      | 0.9       | 67328.9  |              |        |
| 6                                                   | CL                | 10.006  | 119.3   | 6.784  | 0.510      | 0.9       | 31644    | Deteriorated |        |
| 7                                                   | CHL<br>(Measured) | 10.006  | 134.53  | 3.999  | 0.270      | 0.9       | 35685.3  | Good         |        |
| 8                                                   | CHL               | *       | 134.53  | 4.04   | 0.270      | 0.9       | 35684.9  | Good         |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |         |        |            |           |          |              |        |
|                                                     | CH-C1             | CH'     | 37.087  | 3.921  | 0.950      | 0.9       | 9837.1   |              |        |
|                                                     | CL-C1             | CL'     | 119.3   | 6.784  | 0.510      | 0.9       | 31644    |              |        |

|            |                         |                           |                                 |
|------------|-------------------------|---------------------------|---------------------------------|
| <b>LSR</b> | mA: 171.73/171.728, 1/1 | Watts: 8.001/8.001, 1/1   | Cap (pF): 45551.5/45551.54, 1/1 |
| <b>LSR</b> | mA: 37.087/37.087, 1/1  | Watts: 3.921/3.921, 1/1   | Cap (pF): 9837.1/9837.097, 1/1  |
| <b>LSR</b> | mA: 134.54/134.539, 1/1 | Watts: 4.019/4.019, 1/1   | Cap (pF): 35687.3/35687.3, 1/1  |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: 253.83/253.83, 1/1  | Watts: 10.824/10.824, 1/1 | Cap (pF): 67328.9/67328.94, 1/1 |
| <b>LSR</b> | mA: 119.3/119.296, 1/1  | Watts: 6.784/6.784, 1/1   | Cap (pF): 31644/31644, 1/1      |
| <b>LSR</b> | mA: 134.53/134.532, 1/1 | Watts: 3.999/3.999, 1/1   | Cap (pF): 35685.3/35685.28, 1/1 |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |

## Hot Collar Tests

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA | Watts | FRANK™ | Manual |
|----------|-----------|---------|----|-------|--------|--------|
| TOP E    | GND RB    | 10.002  | *  | *     |        |        |
| BOT E    | GND RB    | 10.002  | *  | *     |        |        |
| TOP M    | GND RB    | 10.002  | *  | *     |        |        |
| BOT M    | GND RB    | 10.002  | *  | *     |        |        |
| TOP W    | GND RB    | 10.003  | *  | *     |        |        |
| MID-B    | GND RB    | 10.002  | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

3/20/2009 5:14:32 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |         |                         |           |
|--------------------------|-----------|------------------------------|---------|-------------------------|-----------|
| <b>Test Date</b>         | 3/20/2009 | <b>Test Time:</b>            | 5:14 PM | <b>Weather</b>          | Sunny     |
| <b>Air Temperature</b>   | 29°C      | <b>Apparatus Temperature</b> | 38°C    | <b>Humidity</b>         | 23 %      |
| <b>Tester</b>            |           | <b>Work Order</b>            |         | <b>Date Last Tested</b> | 6/14/2006 |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100   | <b>Date Retested</b>    |           |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |         | <b>Reason</b>           |           |
| <b>Last Sheet #</b>      |           | <b>Test Set Model</b>        | M4100   | <b>Travel Time</b>      |           |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |         | <b>Duration</b>         |           |
| <b>Copies</b>            |           | <b>Sheet #</b>               |         | <b>Crew Size</b>        |           |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                     |         |                   |           |                   |                   |
|---------------------|---------|-------------------|-----------|-------------------|-------------------|
| Designation         | X3      | Voltage           | Secondary | Serial #          | 1621228           |
| Catalog #           | 1B564G3 | Amps              | 2000 A    | BIL               | 150 kV            |
| Class               |         | Year              | 1982      | Drawing           |                   |
| Style               |         | Other             |           | S.O. Number       |                   |
| Physical Dimensions |         |                   |           |                   |                   |
| Creep Distance *    |         | Overall Length *  |           | Inner Seal Dia. * | Eff. Gnd Sleeve * |
| Total Weight *      |         | Recess Depth *    |           | Outer Seal Dia. * | Slot Size *       |
| Units               |         |                   |           |                   |                   |
| Flange Dimensions   |         |                   |           |                   |                   |
| To Bottom *         |         | # Bolts *         |           | Max. Diameters    | Draw Lead         |
| To Top *            |         | Bolt Size *       |           | Below Flange *    | Tube ID *         |
|                     |         | Circle Diameter * |           | Above Flange *    | To Pin *          |

## Overall Tests

|                                              | Insulation        | Test kV | mA      | Watts  | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|----------------------------------------------|-------------------|---------|---------|--------|------------|-----------|----------|--------|--------|
| 1                                            | CH+CHL            | 10.008  | 171.68  | 9.643  | 0.380      | 0.67      | 45538.5  |        |        |
| 2                                            | CH                | 10.005  | 37.157  | 5.208  | 0.940      | 0.67      | 9855.2   | Good   |        |
| 3                                            | CHL<br>(Measured) | 10.004  | 134.43  | 4.384  | 0.220      | 0.67      | 35658.2  | Good   |        |
| 4                                            | CHL               | *       | 134.523 | 4.435  | 0.220      | 0.67      | 35683.3  | Good   |        |
| 5                                            | CL+CHL            | 10.009  | 253.31  | 10.823 | 0.290      | 0.67      | 67191.4  |        |        |
| 6                                            | CL                | 10.006  | 118.93  | 6.612  | 0.380      | 0.67      | 31546.2  | Good   |        |
| 7                                            | CHL<br>(Measured) | 10.006  | 134.42  | 4.3    | 0.210      | 0.67      | 35656    | Good   |        |
| 8                                            | CHL               | *       | 134.38  | 4.211  | 0.210      | 0.67      | 35645.2  | Good   |        |
| Winding without Attached Bushing Calculation |                   |         |         |        |            |           |          |        |        |
|                                              | CH-C1             | CH'     | 37.157  | 5.208  | 0.940      | 0.67      | 9855.2   |        |        |
|                                              | CL-C1             | CL'     | 118.93  | 6.612  | 0.380      | 0.67      | 31546.2  |        |        |

|     |                         |                           |                                 |
|-----|-------------------------|---------------------------|---------------------------------|
| LSR | mA: 171.68/171.681, 1/1 | Watts: 9.643/9.643, 1/1   | Cap (pF): 45538.5/45538.47, 1/1 |
| LSR | mA: 37.157/37.157, 1/1  | Watts: 5.208/5.208, 1/1   | Cap (pF): 9855.2/9855.203, 1/1  |
| LSR | mA: 134.43/134.431, 1/1 | Watts: 4.384/4.384, 1/1   | Cap (pF): 35658.2/35658.23, 1/1 |
| LSR | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| LSR | mA: 253.31/253.309, 1/1 | Watts: 10.823/10.823, 1/1 | Cap (pF): 67191.4/67191.35, 1/1 |
| LSR | mA: 118.93/118.93, 1/1  | Watts: 6.612/6.612, 1/1   | Cap (pF): 31546.2/31546.21, 1/1 |
| LSR | mA: 134.42/134.421, 1/1 | Watts: 4.3/4.3, 1/1       | Cap (pF): 35656/35656.02, 1/1   |
| LSR | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| LSR | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |
| LSR | mA: */*, */*            | Watts: */*, */*           | Cap (pF): */*, */*              |

## Hot Collar Tests

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10.002   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA | Watts | FRANK™ | Manual |
|----------|-----------|---------|----|-------|--------|--------|
| TOP E    | GND RB    | 10.002  | *  | *     |        |        |
| BOT E    | GND RB    | 10.002  | *  | *     |        |        |
| TOP M    | GND RB    | 10.002  | *  | *     |        |        |
| BOT M    | GND RB    | 10.002  | *  | *     |        |        |
| TOP W    | GND RB    | 10.003  | *  | *     |        |        |
| MID-B    | GND RB    | 10.002  | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |
| LSR | mA: */*, */* | Watts: */*, */* | Cap (pF): */*, */* |



**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

6/14/2006 12:35:44 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |          |                         |               |
|--------------------------|-----------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 6/14/2006 | <b>Test Time:</b>            | 12:35 PM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 31°C      | <b>Apparatus Temperature</b> | 37.5°C   | <b>Humidity</b>         | 90 %          |
| <b>Tester</b>            |           | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 3/5/2001      |
| <b>Verified</b>          |           | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> |           | <b>Set Top Serial #</b>      |          | <b>Reason</b>           | Routine       |
| <b>Last Sheet #</b>      | 34-2M-01  | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    |           | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |           | <b>Sheet #</b>               |          | <b>Crew Size</b>        |               |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA      | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|-----------------------------------------------------|-------------------|---------|---------|-------|------------|-----------|----------|--------|--------|
| 1                                                   | CH+CHL            | 10.005  | 170.84  | 5.145 | *          | 0.67      | 45315.6  |        |        |
| 2                                                   | CH                | 10.003  | 37.261  | 1.468 | 0.260      | 0.67      | 9883.6   | Good   |        |
| 3                                                   | CHL<br>(Measured) | 10.002  | 133.44  | 3.654 | 0.180      | 0.67      | 35394.9  | Good   |        |
| 4                                                   | CHL               | *       | 133.579 | 3.677 | 0.190      | 0.67      | 35432    | Good   |        |
| 5                                                   | CL+CHL            | 10.006  | 253.87  | 9.744 | *          | 0.67      | 67338.8  |        |        |
| 6                                                   | CL                | 10.003  | 120.4   | 6.028 | 0.340      | 0.67      | 31935.3  | Good   |        |
| 7                                                   | CHL<br>(Measured) | 10.003  | 133.42  | 3.623 | 0.180      | 0.67      | 35390.6  | Good   |        |
| 8                                                   | CHL               | *       | 133.47  | 3.716 | 0.190      | 0.67      | 35403.5  | Good   |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |         |       |            |           |          |        |        |
|                                                     | CH-C1             | CH'     | 31.055  | 1.225 | 0.260      | 0.67      | 8237.76  |        |        |
|                                                     | CL-C1             | CL'     | 120.4   | 6.028 | 0.340      | 0.67      | 31935.3  |        |        |

|            |                         |                         |                                 |
|------------|-------------------------|-------------------------|---------------------------------|
| <b>LSR</b> | mA: 170.84/170.84, 1/1  | Watts: 5.145/5.145, 1/1 | Cap (pF): 45315.6/45315.58, 1/1 |
| <b>LSR</b> | mA: 37.261/37.261, 1/1  | Watts: 1.468/1.468, 1/1 | Cap (pF): 9883.6/9883.616, 1/1  |
| <b>LSR</b> | mA: 133.44/133.438, 1/1 | Watts: 3.654/3.654, 1/1 | Cap (pF): 35394.9/35394.88, 1/1 |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*         | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: 253.87/253.865, 1/1 | Watts: 9.744/9.744, 1/1 | Cap (pF): 67338.8/67338.79, 1/1 |
| <b>LSR</b> | mA: 120.4/120.395, 1/1  | Watts: 6.028/6.028, 1/1 | Cap (pF): 31935.3/31935.28, 1/1 |
| <b>LSR</b> | mA: 133.42/133.422, 1/1 | Watts: 3.623/3.623, 1/1 | Cap (pF): 35390.6/35390.64, 1/1 |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*         | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*         | Cap (pF): */*, */*              |
| <b>LSR</b> | mA: */*, */*            | Watts: */*, */*         | Cap (pF): */*, */*              |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 1721689  | 10.003  | 2.494 | 0.1   | 0.97      | 0.390      | 0.36   | 661.49   | 662    | Good         |        |
| H1 | H24191   | 10.003  | 1.243 | 0.051 | 1.32      | 0.540      | 0.52   | 329.61   | 334    | Deteriorated | Good   |
| H2 | H24190   | 10.003  | 1.244 | 0.044 | 1.32      | 0.460      | 0.48   | 329.91   | 334    | Good         |        |
| H3 | H24189   | 10.003  | 1.225 | 0.048 | 1.32      | 0.510      | 0.51   | 324.83   | 329    | Deteriorated | Good   |

|     |  |                      |  |                         |  |                               |
|-----|--|----------------------|--|-------------------------|--|-------------------------------|
| LSR |  | mA: 1.243/1.243, 1/1 |  | Watts: 0.051/0.051, 1/1 |  | Cap (pF): 329.61/329.613, 1/1 |
| LSR |  | mA: 1.244/1.244, 1/1 |  | Watts: 0.044/0.044, 1/1 |  | Cap (pF): 329.91/329.909, 1/1 |
| LSR |  | mA: 1.225/1.225, 1/1 |  | Watts: 0.048/0.048, 1/1 |  | Cap (pF): 324.83/324.833, 1/1 |
| LSR |  | mA: 2.494/2.494, 1/1 |  | Watts: 0.1/0.1, 1/1     |  | Cap (pF): 661.49/661.492, 1/1 |

**Bushing Test (C2)**

| ID | Serial # | Test kV | mA     | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|--------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 0.5     | 1.819  | 0.071 | 1         | 0.390      | *      | 482.37   | *      | Good   |        |
| H1 | H24191   | 2       | 15.345 | 0.611 | 1         | 0.400      | *      | 4070.4   | *      | Good   |        |
| H2 | H24190   | 2       | 15.04  | 0.556 | 1         | 0.370      | *      | 3989.5   | *      | Good   |        |
| H3 | H24189   | 2       | 15.109 | 0.615 | 1         | 0.410      | *      | 4007.9   | *      | Good   |        |

|     |  |                        |  |                         |  |                                |
|-----|--|------------------------|--|-------------------------|--|--------------------------------|
| LSR |  | mA: 15.345/15.345, 1/1 |  | Watts: 0.611/0.611, 1/1 |  | Cap (pF): 4070.4/4070.394, 1/1 |
| LSR |  | mA: 15.04/15.04, 1/1   |  | Watts: 0.556/0.556, 1/1 |  | Cap (pF): 3989.5/3989.472, 1/1 |
| LSR |  | mA: 15.109/15.109, 1/1 |  | Watts: 0.615/0.615, 1/1 |  | Cap (pF): 4007.9/4007.878, 1/1 |
| LSR |  | mA: 1.819/1.819, 1/1   |  | Watts: 0.071/0.071, 1/1 |  | Cap (pF): 482.37/482.37, 1/1   |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10.002   | *  | *     | 10.002                 | *  | 0.066 | Good   |        |
| X2 | 1730045  | GND RB    | 6       | 10.002   | *  | *     | 10.002                 | *  | 0.075 | Good   |        |
| X3 | 1730047  | GND RB    | 6       | 10.002   | *  | *     | 10.002                 | *  | 0.058 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10.002  | 0.284 | 0.065 | Good   |        |
| BOT E    | GND RB    | 10.002  | 0.299 | 0.07  | Good   |        |
| TOP M    | GND RB    | 10.002  | 0.287 | 0.069 | Good   |        |
| BOT M    | GND RB    | 10.002  | 0.302 | 0.074 | Good   |        |
| TOP W    | GND RB    | 10.003  | 0.281 | 0.059 | Good   |        |
| MID-B    | GND RB    | 10.002  | 0.301 | 0.072 | Good   |        |

|            |                      |                         |                              |
|------------|----------------------|-------------------------|------------------------------|
| <b>LSR</b> | mA: 0.284/0.284, 1/1 | Watts: 0.065/0.065, 1/1 | Cap (pF): 75.213/75.213, 1/1 |
| <b>LSR</b> | mA: 0.299/0.299, 1/1 | Watts: 0.07/0.07, 1/1   | Cap (pF): 79.362/79.362, 1/1 |
| <b>LSR</b> | mA: 0.287/0.287, 1/1 | Watts: 0.069/0.069, 1/1 | Cap (pF): 76.068/76.068, 1/1 |
| <b>LSR</b> | mA: 0.302/0.302, 1/1 | Watts: 0.074/0.074, 1/1 | Cap (pF): 79.975/79.975, 1/1 |
| <b>LSR</b> | mA: 0.281/0.281, 1/1 | Watts: 0.059/0.059, 1/1 | Cap (pF): 74.599/74.599, 1/1 |
| <b>LSR</b> | mA: 0.301/0.301, 1/1 | Watts: 0.072/0.072, 1/1 | Cap (pF): 79.77/79.77, 1/1   |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date** 3/5/2001 8:18:03 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |           |                              |                 |                         |            |
|--------------------------|-----------|------------------------------|-----------------|-------------------------|------------|
| <b>Test Date</b>         | 3/5/2001  | <b>Test Time:</b>            | 8:18 AM         | <b>Weather</b>          | Sunny      |
| <b>Air Temperature</b>   | 19°C      | <b>Apparatus Temperature</b> | 20°C            | <b>Humidity</b>         | 71 %       |
| <b>Tester</b>            | MGL       | <b>Work Order</b>            | 2001-2990020242 | <b>Date Last Tested</b> | 10/12/2000 |
| <b>Verified</b>          | SDS       | <b>Test Set Type</b>         | M4100           | <b>Date Retested</b>    |            |
| <b>Verification Date</b> | 3/27/2001 | <b>Set Top Serial #</b>      | 387             | <b>Reason</b>           | Routine    |
| <b>Last Sheet #</b>      | 34-2M-00  | <b>Test Set Model</b>        | M4100           | <b>Travel Time</b>      |            |
| <b>Purchase Order</b>    | 56207-601 | <b>Ins. Book #</b>           |                 | <b>Duration</b>         |            |
| <b>Copies</b>            |           | <b>Sheet #</b>               | 34-2M-01        | <b>Crew Size</b>        |            |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |



**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X3**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Overall Tests**

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10             | 171.5     | 5.809        | *                 | 0.99             | 45508           |               |               |
| 2                                                   | CH                | 10             | 37.16     | 1.613        | 0.430             | 0.99             | 9858            | Good          |               |
| 3                                                   | CHL<br>(Measured) | 10             | 134.3     | 4.217        | 0.310             | 0.99             | 35648           | Good          |               |
| 4                                                   | CHL               | *              | 134.34    | 4.196        | 0.310             | 0.99             | 35650           | Good          |               |
| 5                                                   | CL+CHL            | 10             | 253.8     | 9.927        | *                 | 0.99             | 67334           |               |               |
| 6                                                   | CL                | 10             | 119.4     | 5.915        | 0.500             | 0.99             | 31685           | Good          |               |
| 7                                                   | CHL<br>(Measured) | 10             | 134.3     | 4.206        | 0.310             | 0.99             | 35645           | Good          |               |
| 8                                                   | CHL               | *              | 134.4     | 4.012        | 0.300             | 0.99             | 35649           | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 30.992    | 1.346        | 0.430             | 0.99             | 8222.1          |               |               |

|            |                      |                         |                            |
|------------|----------------------|-------------------------|----------------------------|
| <b>LSR</b> | mA: 171.5/171.5, 1/1 | Watts: 5.809/5.809, 1/1 | Cap (pF): 45508/45508, 1/1 |
| <b>LSR</b> | mA: 37.16/37.16, 1/1 | Watts: 1.613/1.613, 1/1 | Cap (pF): 9858/9858, 1/1   |
| <b>LSR</b> | mA: 134.3/134.3, 1/1 | Watts: 4.217/4.217, 1/1 | Cap (pF): 35648/35648, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: 253.8/253.8, 1/1 | Watts: 9.927/9.927, 1/1 | Cap (pF): 67334/67334, 1/1 |
| <b>LSR</b> | mA: 119.4/119.4, 1/1 | Watts: 5.915/5.915, 1/1 | Cap (pF): 31685/31685, 1/1 |
| <b>LSR</b> | mA: 134.3/134.3, 1/1 | Watts: 4.206/4.206, 1/1 | Cap (pF): 35645/35645, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10      | 2.476 | 0.094 | 1         | 0.380      | 0.36   | 656.6    | 662    | Good   |        |
| H1 | H24191   | 10      | 1.237 | 0.061 | 0.99      | 0.490      | 0.52   | 328      | 334    | Good   |        |
| H2 | H24190   | 10      | 1.238 | 0.056 | 0.99      | 0.450      | 0.48   | 328.4    | 334    | Good   |        |
| H3 | H24189   | 10      | 1.217 | 0.056 | 0.99      | 0.460      | 0.51   | 322.9    | 329    | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 1.237/1.237, 1/1 |  | Watts: 0.061/0.061, 1/1 |  | Cap (pF): 328/328, 1/1     |
| LSR |  | mA: 1.238/1.238, 1/1 |  | Watts: 0.056/0.056, 1/1 |  | Cap (pF): 328.4/328.4, 1/1 |
| LSR |  | mA: 1.217/1.217, 1/1 |  | Watts: 0.056/0.056, 1/1 |  | Cap (pF): 322.9/322.9, 1/1 |
| LSR |  | mA: 2.476/2.476, 1/1 |  | Watts: 0.094/0.094, 1/1 |  | Cap (pF): 656.6/656.6, 1/1 |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.039 | Good   |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.092 | Good   |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.046 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10      | 0.292 | 0.04  | Good   |        |
| BOT E    | GND RB    | 10      | 0.299 | 0.047 | Good   |        |
| TOP M    | GND RB    | 10      | 0.286 | 0.041 | Good   |        |
| BOT M    | GND RB    | 10      | 0.3   | 0.05  | Good   |        |
| TOP W    | GND RB    | 10      | 0.285 | 0.038 | Good   |        |
| MID-B    | GND RB    | 10      | 0.299 | 0.048 | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 0.292/0.292, 1/1 |  | Watts: 0.04/0.04, 1/1   |  | Cap (pF): 77.39/77.39, 1/1 |
| LSR |  | mA: 0.299/0.299, 1/1 |  | Watts: 0.047/0.047, 1/1 |  | Cap (pF): 79.37/79.37, 1/1 |
| LSR |  | mA: 0.286/0.286, 1/1 |  | Watts: 0.041/0.041, 1/1 |  | Cap (pF): 75.79/75.79, 1/1 |
| LSR |  | mA: 0.3/0.3, 1/1     |  | Watts: 0.05/0.05, 1/1   |  | Cap (pF): 79.62/79.62, 1/1 |
| LSR |  | mA: 0.285/0.285, 1/1 |  | Watts: 0.038/0.038, 1/1 |  | Cap (pF): 75.59/75.59, 1/1 |
| LSR |  | mA: 0.299/0.299, 1/1 |  | Watts: 0.048/0.048, 1/1 |  | Cap (pF): 79.29/79.29, 1/1 |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date** 10/12/2000 12:55:02 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |                  |                              |                 |                         |               |
|--------------------------|------------------|------------------------------|-----------------|-------------------------|---------------|
| <b>Test Date</b>         | 10/12/2000       | <b>Test Time:</b>            | 12:55 PM        | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 29°C             | <b>Apparatus Temperature</b> | 40°C            | <b>Humidity</b>         | 49 %          |
| <b>Tester</b>            | KEF              | <b>Work Order</b>            | 2000-2990017136 | <b>Date Last Tested</b> | 10/27/1999    |
| <b>Verified</b>          | SDS              | <b>Test Set Type</b>         | M4100           | <b>Date Retested</b>    |               |
| <b>Verification Date</b> | 10/23/2000       | <b>Set Top Serial #</b>      | 377             | <b>Reason</b>           | Routine       |
| <b>Last Sheet #</b>      | 34-2M-99         | <b>Test Set Model</b>        | M4100           | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    | 312-57000-01-901 | <b>Ins. Book #</b>           |                 | <b>Duration</b>         |               |
| <b>Copies</b>            |                  | <b>Sheet #</b>               | 34-2M-00        | <b>Crew Size</b>        |               |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |



**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Overall Tests

|                                                     | Insulation        | Test kV | mA     | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|-----------------------------------------------------|-------------------|---------|--------|-------|------------|-----------|----------|--------|--------|
| 1                                                   | CH+CHL            | 10      | 171.3  | 5.454 | *          | 0.89      | 45447    |        |        |
| 2                                                   | CH                | 10      | 37.16  | 1.481 | 0.360      | 0.89      | 9857     | Good   |        |
| 3                                                   | CHL<br>(Measured) | 10      | 134.1  | 3.942 | 0.260      | 0.89      | 35593    | Good   |        |
| 4                                                   | CHL               | *       | 134.14 | 3.973 | 0.270      | 0.89      | 35590    | Good   |        |
| 5                                                   | CL+CHL            | 10      | 253.8  | 9.75  | *          | 0.89      | 67336    |        |        |
| 6                                                   | CL                | 10      | 119.6  | 5.838 | 0.440      | 0.89      | 31745    | Good   |        |
| 7                                                   | CHL<br>(Measured) | 10      | 134.1  | 3.94  | 0.260      | 0.89      | 35594    | Good   |        |
| 8                                                   | CHL               | *       | 134.2  | 3.912 | 0.260      | 0.89      | 35591    | Good   |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |        |       |            |           |          |        |        |
|                                                     | CH-C1             | CH'     | 30.966 | 1.248 | 0.360      | 0.89      | 8214.2   |        |        |

|            |                      |                         |                            |
|------------|----------------------|-------------------------|----------------------------|
| <b>LSR</b> | mA: 171.3/171.3, 1/1 | Watts: 5.454/5.454, 1/1 | Cap (pF): 45447/45447, 1/1 |
| <b>LSR</b> | mA: 37.16/37.16, 1/1 | Watts: 1.481/1.481, 1/1 | Cap (pF): 9857/9857, 1/1   |
| <b>LSR</b> | mA: 134.1/134.1, 1/1 | Watts: 3.942/3.942, 1/1 | Cap (pF): 35593/35593, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: 253.8/253.8, 1/1 | Watts: 9.75/9.75, 1/1   | Cap (pF): 67336/67336, 1/1 |
| <b>LSR</b> | mA: 119.6/119.6, 1/1 | Watts: 5.838/5.838, 1/1 | Cap (pF): 31745/31745, 1/1 |
| <b>LSR</b> | mA: 134.1/134.1, 1/1 | Watts: 3.94/3.94, 1/1   | Cap (pF): 35594/35594, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 1721689  | 10      | 2.484 | 0.09  | 0.95      | 0.340      | 0.36   | 658.7    | 662    | Good         |        |
| H1 | H24191   | 10      | 1.242 | 0.051 | 1.34      | 0.550      | 0.52   | 329.5    | 334    | Good         |        |
| H2 | H24190   | 10      | 1.244 | 0.044 | 1.34      | 0.470      | 0.48   | 329.9    | 334    | Deteriorated | Good   |
| H3 | H24189   | 10      | 1.224 | 0.048 | 1.34      | 0.520      | 0.51   | 324.7    | 329    | Good         |        |

|     |                      |                         |                            |
|-----|----------------------|-------------------------|----------------------------|
| LSR | mA: 1.242/1.242, 1/1 | Watts: 0.051/0.051, 1/1 | Cap (pF): 329.5/329.5, 1/1 |
| LSR | mA: 1.244/1.244, 1/1 | Watts: 0.044/0.044, 1/1 | Cap (pF): 329.9/329.9, 1/1 |
| LSR | mA: 1.224/1.224, 1/1 | Watts: 0.048/0.048, 1/1 | Cap (pF): 324.7/324.7, 1/1 |
| LSR | mA: 2.484/2.484, 1/1 | Watts: 0.09/0.09, 1/1   | Cap (pF): 658.7/658.7, 1/1 |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.049 | Good   |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.055 | Good   |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.055 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10      | 0.284 | 0.054 | Good   |        |
| BOT E    | GND RB    | 10      | 0.295 | 0.065 | Good   |        |
| TOP M    | GND RB    | 10      | 0.28  | 0.06  | Good   |        |
| BOT M    | GND RB    | 10      | 0.295 | 0.068 | Good   |        |
| TOP W    | GND RB    | 10      | 0.282 | 0.055 | Good   |        |
| MID-B    | GND RB    | 10      | 0.295 | 0.072 | Good   |        |

|     |                      |                         |                            |
|-----|----------------------|-------------------------|----------------------------|
| LSR | mA: 0.284/0.284, 1/1 | Watts: 0.054/0.054, 1/1 | Cap (pF): 75.41/75.41, 1/1 |
| LSR | mA: 0.295/0.295, 1/1 | Watts: 0.065/0.065, 1/1 | Cap (pF): 78.1/78.1, 1/1   |
| LSR | mA: 0.28/0.28, 1/1   | Watts: 0.06/0.06, 1/1   | Cap (pF): 74.21/74.21, 1/1 |
| LSR | mA: 0.295/0.295, 1/1 | Watts: 0.068/0.068, 1/1 | Cap (pF): 78.27/78.27, 1/1 |
| LSR | mA: 0.282/0.282, 1/1 | Watts: 0.055/0.055, 1/1 | Cap (pF): 74.79/74.79, 1/1 |
| LSR | mA: 0.295/0.295, 1/1 | Watts: 0.072/0.072, 1/1 | Cap (pF): 78.31/78.31, 1/1 |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date** 10/27/1999 1:58:58 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> | UNIT #2           |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |            |                              |                 |                         |            |
|--------------------------|------------|------------------------------|-----------------|-------------------------|------------|
| <b>Test Date</b>         | 10/27/1999 | <b>Test Time:</b>            | 1:58 PM         | <b>Weather</b>          | Sunny      |
| <b>Air Temperature</b>   | 26°C       | <b>Apparatus Temperature</b> | 24°C            | <b>Humidity</b>         | 45 %       |
| <b>Tester</b>            | MWV        | <b>Work Order</b>            | 1999-2990012251 | <b>Date Last Tested</b> | 12/12/1998 |
| <b>Verified</b>          | SDS        | <b>Test Set Type</b>         | M4100           | <b>Date Retested</b>    |            |
| <b>Verification Date</b> | 11/9/1999  | <b>Set Top Serial #</b>      | 387             | <b>Reason</b>           | Routine    |
| <b>Last Sheet #</b>      | 34-2M-98   | <b>Test Set Model</b>        | M4100           | <b>Travel Time</b>      |            |
| <b>Purchase Order</b>    | 56207-901  | <b>Ins. Book #</b>           |                 | <b>Duration</b>         |            |
| <b>Copies</b>            |            | <b>Sheet #</b>               | 34-2M-99        | <b>Crew Size</b>        |            |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA     | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™       | Manual |
|-----------------------------------------------------|-------------------|---------|--------|-------|------------|-----------|----------|--------------|--------|
| 1                                                   | CH+CHL            | 10      | 171.6  | 5.798 | *          | 0.98      | 45539    |              |        |
| 2                                                   | CH                | 10      | 37.12  | 1.607 | 0.420      | 0.98      | 9847     | Good         |        |
| 3                                                   | CHL<br>(Measured) | 10      | 134.5  | 4.205 | 0.300      | 0.98      | 35690    | Deteriorated | Good   |
| 4                                                   | CHL               | *       | 134.48 | 4.191 | 0.300      | 0.98      | 35692    | Good         |        |
| 5                                                   | CL+CHL            | 10      | 253.6  | 9.494 | *          | 0.98      | 67268    |              |        |
| 6                                                   | CL                | 10      | 119    | 5.534 | 0.460      | 0.98      | 31580    | Good         |        |
| 7                                                   | CHL<br>(Measured) | 10      | 134.5  | 4.261 | 0.310      | 0.98      | 35684    | Good         |        |
| 8                                                   | CHL               | *       | 134.6  | 3.96  | 0.280      | 0.98      | 35688    | Good         |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |        |       |            |           |          |              |        |
|                                                     | CH-C1             | CH'     | 30.953 | 1.337 | 0.420      | 0.98      | 8211.3   |              |        |

|            |                      |                         |                            |
|------------|----------------------|-------------------------|----------------------------|
| <b>LSR</b> | mA: 171.6/171.6, 1/1 | Watts: 5.798/5.798, 1/1 | Cap (pF): 45539/45539, 1/1 |
| <b>LSR</b> | mA: 37.12/37.12, 1/1 | Watts: 1.607/1.607, 1/1 | Cap (pF): 9847/9847, 1/1   |
| <b>LSR</b> | mA: 134.5/134.5, 1/1 | Watts: 4.205/4.205, 1/1 | Cap (pF): 35690/35690, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: 253.6/253.6, 1/1 | Watts: 9.494/9.494, 1/1 | Cap (pF): 67268/67268, 1/1 |
| <b>LSR</b> | mA: 119/119, 1/1     | Watts: 5.534/5.534, 1/1 | Cap (pF): 31580/31580, 1/1 |
| <b>LSR</b> | mA: 134.5/134.5, 1/1 | Watts: 4.261/4.261, 1/1 | Cap (pF): 35684/35684, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |



**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™       | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------------|--------|
| H0 | 1721689  | 10      | 2.473 | 0.093 | 0.99      | 0.380      | 0.36   | 656      | 662    | Good         |        |
| H1 | H24191   | 10      | 1.236 | 0.062 | 1.12      | 0.560      | 0.52   | 327.8    | 334    | Good         |        |
| H2 | H24190   | 10      | 1.239 | 0.057 | 1.12      | 0.520      | 0.48   | 328.6    | 334    | Deteriorated | Good   |
| H3 | H24189   | 10      | 1.219 | 0.058 | 1.12      | 0.540      | 0.51   | 323.3    | 329    | Good         |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 1.236/1.236, 1/1 |  | Watts: 0.062/0.062, 1/1 |  | Cap (pF): 327.8/327.8, 1/1 |
| LSR |  | mA: 1.239/1.239, 1/1 |  | Watts: 0.057/0.057, 1/1 |  | Cap (pF): 328.6/328.6, 1/1 |
| LSR |  | mA: 1.219/1.219, 1/1 |  | Watts: 0.058/0.058, 1/1 |  | Cap (pF): 323.3/323.3, 1/1 |
| LSR |  | mA: 2.473/2.473, 1/1 |  | Watts: 0.093/0.093, 1/1 |  | Cap (pF): 656/656, 1/1     |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.049 | Good   |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.05  | Good   |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.035 | Good   |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10      | 0.289 | 0.044 | Good   |        |
| BOT E    | GND RB    | 10      | 0.3   | 0.054 | Good   |        |
| TOP M    | GND RB    | 10      | 0.283 | 0.046 | Good   |        |
| BOT M    | GND RB    | 10      | 0.303 | 0.056 | Good   |        |
| TOP W    | GND RB    | 10      | 0.281 | 0.044 | Good   |        |
| MID-B    | GND RB    | 10      | 0.299 | 0.054 | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 0.289/0.289, 1/1 |  | Watts: 0.044/0.044, 1/1 |  | Cap (pF): 76.68/76.68, 1/1 |
| LSR |  | mA: 0.3/0.3, 1/1     |  | Watts: 0.054/0.054, 1/1 |  | Cap (pF): 79.67/79.67, 1/1 |
| LSR |  | mA: 0.283/0.283, 1/1 |  | Watts: 0.046/0.046, 1/1 |  | Cap (pF): 74.95/74.95, 1/1 |
| LSR |  | mA: 0.303/0.303, 1/1 |  | Watts: 0.056/0.056, 1/1 |  | Cap (pF): 80.38/80.38, 1/1 |
| LSR |  | mA: 0.281/0.281, 1/1 |  | Watts: 0.044/0.044, 1/1 |  | Cap (pF): 74.62/74.62, 1/1 |
| LSR |  | mA: 0.299/0.299, 1/1 |  | Watts: 0.054/0.054, 1/1 |  | Cap (pF): 79.41/79.41, 1/1 |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

12/12/1998 9:00:36 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> |                   |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |                  |                              |          |                         |               |
|--------------------------|------------------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 12/12/1998       | <b>Test Time:</b>            | 9:00 AM  | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 31°C             | <b>Apparatus Temperature</b> | 63°C     | <b>Humidity</b>         | 69 %          |
| <b>Tester</b>            | RBC              | <b>Work Order</b>            | 19982088 | <b>Date Last Tested</b> | 11/25/1997    |
| <b>Verified</b>          | SDS              | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> | 4/28/1999        | <b>Set Top Serial #</b>      | 387      | <b>Reason</b>           | Routine       |
| <b>Last Sheet #</b>      | 34-2M-97         | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    | 312-56207-01-901 | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |                  | <b>Sheet #</b>               | 34-2M-98 | <b>Crew Size</b>        |               |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

### Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

### Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA     | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™       | Manual |
|-----------------------------------------------------|-------------------|---------|--------|-------|------------|-----------|----------|--------------|--------|
| 1                                                   | CH+CHL            | 10      | 171.6  | 7.663 | *          | 0.71      | 45505    |              |        |
| 2                                                   | CH                | 10      | 37.27  | 1.932 | 0.370      | 0.71      | 9883     | Good         |        |
| 3                                                   | CHL<br>(Measured) | 10      | 134.3  | 5.753 | 0.310      | 0.71      | 35623    | Deteriorated |        |
| 4                                                   | CHL               | *       | 134.33 | 5.731 | 0.310      | 0.71      | 35622    | Good         |        |
| 5                                                   | CL+CHL            | 10      | 253.7  | 13.16 | *          | 0.71      | 67285    |              |        |
| 6                                                   | CL                | 10      | 119.4  | 7.616 | 0.450      | 0.71      | 31661    | Good         |        |
| 7                                                   | CHL<br>(Measured) | 10      | 134.3  | 5.745 | 0.310      | 0.71      | 35620    | Good         |        |
| 8                                                   | CHL               | *       | 134.3  | 5.544 | 0.290      | 0.71      | 35624    | Good         |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |        |       |            |           |          |              |        |
|                                                     | CH-C1             | CH'     | 31.051 | 1.72  | 0.390      | 0.71      | 8234     |              |        |

|            |                      |                         |                            |
|------------|----------------------|-------------------------|----------------------------|
| <b>LSR</b> | mA: 171.6/171.6, 1/1 | Watts: 7.663/7.663, 1/1 | Cap (pF): 45505/45505, 1/1 |
| <b>LSR</b> | mA: 37.27/37.27, 1/1 | Watts: 1.932/1.932, 1/1 | Cap (pF): 9883/9883, 1/1   |
| <b>LSR</b> | mA: 134.3/134.3, 1/1 | Watts: 5.753/5.753, 1/1 | Cap (pF): 35623/35623, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: 253.7/253.7, 1/1 | Watts: 13.16/13.16, 1/1 | Cap (pF): 67285/67285, 1/1 |
| <b>LSR</b> | mA: 119.4/119.4, 1/1 | Watts: 7.616/7.616, 1/1 | Cap (pF): 31661/31661, 1/1 |
| <b>LSR</b> | mA: 134.3/134.3, 1/1 | Watts: 5.745/5.745, 1/1 | Cap (pF): 35620/35620, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10      | 2.493 | 0.092 | 0.86      | 0.320      | 0.36   | 661.2    | 662    | Good   |        |
| H1 | H24191   | 10      | 1.247 | 0.047 | 1.58      | 0.600      | 0.52   | 330.5    | 334    | Good   |        |
| H2 | H24190   | 10      | 1.249 | 0.033 | 1.58      | 0.410      | 0.48   | 331.2    | 334    | Good   |        |
| H3 | H24189   | 10      | 1.23  | 0.04  | 1.57      | 0.520      | 0.51   | 326.1    | 329    | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 1.247/1.247, 1/1 |  | Watts: 0.047/0.047, 1/1 |  | Cap (pF): 330.5/330.5, 1/1 |
| LSR |  | mA: 1.249/1.249, 1/1 |  | Watts: 0.033/0.033, 1/1 |  | Cap (pF): 331.2/331.2, 1/1 |
| LSR |  | mA: 1.23/1.23, 1/1   |  | Watts: 0.04/0.04, 1/1   |  | Cap (pF): 326.1/326.1, 1/1 |
| LSR |  | mA: 2.493/2.493, 1/1 |  | Watts: 0.092/0.092, 1/1 |  | Cap (pF): 661.2/661.2, 1/1 |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™      | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|-------------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |             |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.056 | Good        |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.107 | Investigate |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | 10                     | *  | 0.047 | Good        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |             |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |             |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™      | Manual |
|----------|-----------|---------|-------|-------|-------------|--------|
| TOP E    | GND RB    | 10      | 0.286 | 0.052 | Investigate | Good   |
| BOT E    | GND RB    | 10      | 0.298 | 0.063 | Investigate | Good   |
| TOP M    | GND RB    | 10      | 0.286 | 0.054 | Investigate | Good   |
| BOT M    | GND RB    | 10      | 0.3   | 0.065 | Investigate | Good   |
| TOP W    | GND RB    | 10      | 0.28  | 0.05  | Investigate | Good   |
| MID-B    | GND RB    | 10      | 0.296 | 0.062 | Investigate | Good   |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 0.286/0.286, 1/1 |  | Watts: 0.052/0.052, 1/1 |  | Cap (pF): 75.91/75.91, 1/1 |
| LSR |  | mA: 0.298/0.298, 1/1 |  | Watts: 0.063/0.063, 1/1 |  | Cap (pF): 78.95/78.95, 1/1 |
| LSR |  | mA: 0.286/0.286, 1/1 |  | Watts: 0.054/0.054, 1/1 |  | Cap (pF): 75.86/75.86, 1/1 |
| LSR |  | mA: 0.3/0.3, 1/1     |  | Watts: 0.065/0.065, 1/1 |  | Cap (pF): 79.53/79.53, 1/1 |
| LSR |  | mA: 0.28/0.28, 1/1   |  | Watts: 0.05/0.05, 1/1   |  | Cap (pF): 74.29/74.29, 1/1 |
| LSR |  | mA: 0.296/0.296, 1/1 |  | Watts: 0.062/0.062, 1/1 |  | Cap (pF): 78.53/78.53, 1/1 |

**Report Source**

A:\SHARDDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date** 11/25/1997 10:52:28 AM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> |                   |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |                  |                              |          |                         |               |
|--------------------------|------------------|------------------------------|----------|-------------------------|---------------|
| <b>Test Date</b>         | 11/25/1997       | <b>Test Time:</b>            | 10:52 AM | <b>Weather</b>          | Partly Cloudy |
| <b>Air Temperature</b>   | 26°C             | <b>Apparatus Temperature</b> | 60°C     | <b>Humidity</b>         | 56 %          |
| <b>Tester</b>            | DB               | <b>Work Order</b>            | 19971632 | <b>Date Last Tested</b> |               |
| <b>Verified</b>          | SDS              | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |               |
| <b>Verification Date</b> | 4/8/1998         | <b>Set Top Serial #</b>      | 317      | <b>Reason</b>           | Routine       |
| <b>Last Sheet #</b>      | 34-2M-96         | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |               |
| <b>Purchase Order</b>    | 312-56207-01-901 | <b>Ins. Book #</b>           |          | <b>Duration</b>         |               |
| <b>Copies</b>            |                  | <b>Sheet #</b>               | 34-2M-97 | <b>Crew Size</b>        |               |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |



**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance *</b>      | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b> | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>        | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b> | <b>Slot Size *</b>       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom *</b>           | <b># Bolts *</b>         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top *</b>              | <b>Bolt Size *</b>       | <b>Below Flange *</b>    | <b>Tube ID *</b>         |
|                              | <b>Circle Diameter *</b> | <b>Above Flange *</b>    | <b>To Pin *</b>          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X3**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Overall Tests**

|                                                     | <b>Insulation</b> | <b>Test kV</b> | <b>mA</b> | <b>Watts</b> | <b>PF*TCF [%]</b> | <b>Corr Fctr</b> | <b>Cap (pF)</b> | <b>FRANK™</b> | <b>Manual</b> |
|-----------------------------------------------------|-------------------|----------------|-----------|--------------|-------------------|------------------|-----------------|---------------|---------------|
| 1                                                   | CH+CHL            | 10             | 171.6     | 6.266        | *                 | 0.71             | 45540           |               |               |
| 2                                                   | CH                | 10             | 37.21     | 1.638        | 0.310             | 0.71             | 9871            | Good          |               |
| 3                                                   | CHL<br>(Measured) | 10             | 134.4     | 4.671        | 0.250             | 0.71             | 35664           | Good          |               |
| 4                                                   | CHL               | *              | 134.39    | 4.628        | 0.240             | 0.71             | 35669           | Good          |               |
| 5                                                   | CL+CHL            | 7.5            | 253.8     | 11.19        | *                 | 0.71             | 67331           |               |               |
| 6                                                   | CL                | 7.5            | 119.3     | 6.462        | 0.380             | 0.71             | 31645           | Good          |               |
| 7                                                   | CHL<br>(Measured) | 7.5            | 134.3     | 4.701        | 0.250             | 0.71             | 35642           | Good          |               |
| 8                                                   | CHL               | *              | 134.5     | 4.728        | 0.250             | 0.71             | 35686           | Good          |               |
| <b>Winding without Attached Bushing Calculation</b> |                   |                |           |              |                   |                  |                 |               |               |
|                                                     | CH-C1             | CH'            | 31        | 1.423        | 0.330             | 0.71             | 8224.1          |               |               |

|            |                      |                         |                            |
|------------|----------------------|-------------------------|----------------------------|
| <b>LSR</b> | mA: 171.6/171.6, 1/1 | Watts: 6.266/6.266, 1/1 | Cap (pF): 45540/45540, 1/1 |
| <b>LSR</b> | mA: 37.21/37.21, 1/1 | Watts: 1.638/1.638, 1/1 | Cap (pF): 9871/9871, 1/1   |
| <b>LSR</b> | mA: 134.4/134.4, 1/1 | Watts: 4.671/4.671, 1/1 | Cap (pF): 35664/35664, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: 253.8/253.8, 1/1 | Watts: 11.19/11.19, 1/1 | Cap (pF): 67331/67331, 1/1 |
| <b>LSR</b> | mA: 119.3/119.3, 1/1 | Watts: 6.462/6.462, 1/1 | Cap (pF): 31645/31645, 1/1 |
| <b>LSR</b> | mA: 134.3/134.3, 1/1 | Watts: 4.701/4.701, 1/1 | Cap (pF): 35642/35642, 1/1 |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |
| <b>LSR</b> | mA: */*, */*         | Watts: */*, */*         | Cap (pF): */*, */*         |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA    | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|-------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10      | 2.491 | 0.089 | 0.9       | 0.320      | 0.36   | 660.6    | 662    | Good   |        |
| H1 | H24191   | 10      | 1.246 | 0.049 | 1.52      | 0.590      | 0.52   | 330.4    | 334    | Good   |        |
| H2 | H24190   | 10      | 1.246 | 0.036 | 1.52      | 0.440      | 0.48   | 330.4    | 334    | Good   |        |
| H3 | H24189   | 10      | 1.227 | 0.041 | 1.52      | 0.500      | 0.51   | 325.5    | 329    | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 1.246/1.246, 1/1 |  | Watts: 0.049/0.049, 1/1 |  | Cap (pF): 330.4/330.4, 1/1 |
| LSR |  | mA: 1.246/1.246, 1/1 |  | Watts: 0.036/0.036, 1/1 |  | Cap (pF): 330.4/330.4, 1/1 |
| LSR |  | mA: 1.227/1.227, 1/1 |  | Watts: 0.041/0.041, 1/1 |  | Cap (pF): 325.5/325.5, 1/1 |
| LSR |  | mA: 2.491/2.491, 1/1 |  | Watts: 0.089/0.089, 1/1 |  | Cap (pF): 660.6/660.6, 1/1 |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |  |              |  |                 |  |                    |
|-----|--|--------------|--|-----------------|--|--------------------|
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |
| LSR |  | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10      | 0.28  | 0.043 | Good   |        |
| BOT E    | GND RB    | 10      | 0.289 | 0.051 | Good   |        |
| TOP M    | GND RB    | 10      | 0.276 | 0.045 | Good   |        |
| BOT M    | GND RB    | 10      | 0.291 | 0.054 | Good   |        |
| TOP W    | GND RB    | 10      | 0.275 | 0.042 | Good   |        |
| MID-B    | GND RB    | 10      | 0.29  | 0.053 | Good   |        |

|     |  |                      |  |                         |  |                            |
|-----|--|----------------------|--|-------------------------|--|----------------------------|
| LSR |  | mA: 0.28/0.28, 1/1   |  | Watts: 0.043/0.043, 1/1 |  | Cap (pF): 74.36/74.36, 1/1 |
| LSR |  | mA: 0.289/0.289, 1/1 |  | Watts: 0.051/0.051, 1/1 |  | Cap (pF): 76.73/76.73, 1/1 |
| LSR |  | mA: 0.276/0.276, 1/1 |  | Watts: 0.045/0.045, 1/1 |  | Cap (pF): 73.29/73.29, 1/1 |
| LSR |  | mA: 0.291/0.291, 1/1 |  | Watts: 0.054/0.054, 1/1 |  | Cap (pF): 77.27/77.27, 1/1 |
| LSR |  | mA: 0.275/0.275, 1/1 |  | Watts: 0.042/0.042, 1/1 |  | Cap (pF): 72.88/72.88, 1/1 |
| LSR |  | mA: 0.29/0.29, 1/1   |  | Watts: 0.053/0.053, 1/1 |  | Cap (pF): 76.95/76.95, 1/1 |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

6/3/1996 3:43:01 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> |                   |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |          |                              |          |                         |            |
|--------------------------|----------|------------------------------|----------|-------------------------|------------|
| <b>Test Date</b>         | 6/3/1996 | <b>Test Time:</b>            | 3:43 PM  | <b>Weather</b>          | Cloudy     |
| <b>Air Temperature</b>   | 31°C     | <b>Apparatus Temperature</b> | 31°C     | <b>Humidity</b>         | 60 %       |
| <b>Tester</b>            | KF       | <b>Work Order</b>            |          | <b>Date Last Tested</b> | 11/25/1997 |
| <b>Verified</b>          | SDS      | <b>Test Set Type</b>         | M4100    | <b>Date Retested</b>    |            |
| <b>Verification Date</b> | 4/8/1998 | <b>Set Top Serial #</b>      |          | <b>Reason</b>           | Routine    |
| <b>Last Sheet #</b>      | 34-2M-97 | <b>Test Set Model</b>        | M4100    | <b>Travel Time</b>      |            |
| <b>Purchase Order</b>    |          | <b>Ins. Book #</b>           |          | <b>Duration</b>         |            |
| <b>Copies</b>            |          | <b>Sheet #</b>               | 34-2M-98 | <b>Crew Size</b>        |            |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |



## Bushing Additional Details -X1

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X2

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA    | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™ | Manual |
|-----------------------------------------------------|-------------------|---------|-------|-------|------------|-----------|----------|--------|--------|
| 1                                                   | CH+CHL            | 10      | 171.4 | 5.7   | *          | 0.95      | *        |        |        |
| 2                                                   | CH                | 10      | 37    | 1.6   | 0.410      | 0.95      | *        | Good   |        |
| 3                                                   | CHL<br>(Measured) | 10      | 134   | 4     | 0.290      | 0.95      | *        | Good   |        |
| 4                                                   | CHL               | *       | 134.4 | 4.1   | 0.290      | 0.95      | *        | Good   |        |
| 5                                                   | CL+CHL            | 7.5     | 250   | 9.8   | *          | 0.95      | *        |        |        |
| 6                                                   | CL                | 7.5     | 118   | 5.5   | 0.450      | 0.95      | *        | Good   |        |
| 8                                                   | CHL               | *       | 132   | 4.3   | 0.310      | 0.95      | *        | Good   |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |       |       |            |           |          |        |        |
|                                                     | CH-C1             | CH'     | 30.84 | 1.335 | 0.410      | 0.95      | *        |        |        |

|            |                    |                     |                          |
|------------|--------------------|---------------------|--------------------------|
| <b>LSR</b> | mA: 85.7/85.7, 2/2 | Watts: 5.7/5.7, 1/1 | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: 37/37, 1/1     | Watts: 8/8, 0.2/0.2 | Cap (pF): */*, 100/100   |
| <b>LSR</b> | mA: 67/67, 2/2     | Watts: 4/4, 1/1     | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*     | Cap (pF): */*, */*       |
| <b>LSR</b> | mA: 25/25, 10/10   | Watts: 4.9/4.9, 2/2 | Cap (pF): */*, 1000/1000 |
| <b>LSR</b> | mA: 59/59, 2/2     | Watts: 5.5/5.5, 1/1 | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*     | Cap (pF): */*, */*       |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*     | Cap (pF): */*, */*       |

**Bushing Test (C1)**

| ID | Serial # | Test kV | mA   | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10      | 2.46 | 0.098 | 0.97      | 0.390      | 0.36   | 660      | 662    | Good   |        |
| H1 | H24191   | 10      | 1.24 | 0.06  | 1.26      | 0.600      | 0.52   | 330      | 334    | Good   |        |
| H2 | H24190   | 10      | 1.24 | 0.052 | 1.26      | 0.530      | 0.48   | 330      | 334    | Good   |        |
| H3 | H24189   | 10      | 1.22 | 0.055 | 1.26      | 0.570      | 0.51   | 325      | 329    | Good   |        |

|     |                        |  |                           |  |                            |  |
|-----|------------------------|--|---------------------------|--|----------------------------|--|
| LSR | mA: 62/62, 0.02/0.02   |  | Watts: 6/6, 0.01/0.01     |  | Cap (pF): 165/165, 2/2     |  |
| LSR | mA: 62/62, 0.02/0.02   |  | Watts: 5.2/5.2, 0.01/0.01 |  | Cap (pF): 165/165, 2/2     |  |
| LSR | mA: 61/61, 0.02/0.02   |  | Watts: 5.5/5.5, 0.01/0.01 |  | Cap (pF): 162.5/162.5, 2/2 |  |
| LSR | mA: 24.6/24.6, 0.1/0.1 |  | Watts: 4.9/4.9, 0.02/0.02 |  | Cap (pF): 66/66, 10/10     |  |

**Hot Collar Tests**

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |  |                 |  |                    |  |
|-----|--------------|--|-----------------|--|--------------------|--|
| LSR | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: */*, 1/1 |  | Watts: */*, 1/1 |  | Cap (pF): */*, 1/1 |  |

**Core Ground Test**

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

**Surge Arrester Tests**

| Location | Test Mode | Test kV | mA    | Watts | FRANK™ | Manual |
|----------|-----------|---------|-------|-------|--------|--------|
| TOP E    | GND RB    | 10      | 0.285 | 0.049 | Good   |        |
| BOT E    | GND RB    | 10      | 0.295 | 0.06  | Good   |        |
| TOP M    | GND RB    | 10      | 0.279 | 0.049 | Good   |        |
| BOT M    | GND RB    | 10      | 0.294 | 0.06  | Good   |        |
| TOP W    | GND RB    | 10      | 0.277 | 0.051 | Good   |        |
| MID-B    | GND RB    | 10      | 0.294 | 0.056 | Good   |        |

|     |                          |  |                               |  |                    |  |
|-----|--------------------------|--|-------------------------------|--|--------------------|--|
| LSR | mA: 28.5/28.5, 0.01/0.01 |  | Watts: 24.5/24.5, 0.002/0.002 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: 29.5/29.5, 0.01/0.01 |  | Watts: 29.8/29.8, 0.002/0.002 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: 27.9/27.9, 0.01/0.01 |  | Watts: 24.5/24.5, 0.002/0.002 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: 29.4/29.4, 0.01/0.01 |  | Watts: 29.8/29.8, 0.002/0.002 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: 27.7/27.7, 0.01/0.01 |  | Watts: 25.3/25.3, 0.002/0.002 |  | Cap (pF): */*, 1/1 |  |
| LSR | mA: 29.4/29.4, 0.01/0.01 |  | Watts: 28/28, 0.002/0.002     |  | Cap (pF): */*, 1/1 |  |

**Report Source**

A:\SHARDATA\Doble\AAA.Doble.new\DOBLE 6-  
Shortcut\BIG BEND\C-03319-5-1\_X2(1).dtax

**Session Test Date**

12/10/1994 4:00:44 PM

**Nameplate - Two-winding Transformer**

|                          |                |                            |                   |
|--------------------------|----------------|----------------------------|-------------------|
| <b>Company</b>           | Tampa Electric | <b>Serial Number</b>       | C-03319-5-1       |
| <b>Location</b>          | BIG BEND       | <b>Special ID</b>          | 127               |
| <b>Division</b>          | SUBSTATION     | <b>Circuit Designation</b> |                   |
| <b>Manufacturer</b>      | McGraw-Edison  | <b>Configuration</b>       | Y_D               |
| <b>Year Manufactured</b> | 1972           | <b>Tank Type</b>           | N2 Blanket        |
| <b>Mfr Location</b>      | CANONSBURG,PA. | <b>Coolant</b>             | Oil               |
| <b>Phases</b>            | Three          | <b>Class</b>               | FOA               |
| <b>Oil Volume</b>        | 14100 UG       | <b>BIL</b>                 | 825 kV            |
| <b>Weight</b>            | 606600         |                            |                   |
| <b>kV</b>                | 230, 23.4      | <b>VA Rating</b>           | 480, *, *, *, kVA |

**Administration**

|                          |            |                              |           |                         |          |
|--------------------------|------------|------------------------------|-----------|-------------------------|----------|
| <b>Test Date</b>         | 12/10/1994 | <b>Test Time:</b>            | 4:00 PM   | <b>Weather</b>          | Clear    |
| <b>Air Temperature</b>   | 22°C       | <b>Apparatus Temperature</b> | 22°C      | <b>Humidity</b>         | 87 %     |
| <b>Tester</b>            | ML         | <b>Work Order</b>            |           | <b>Date Last Tested</b> | 6/3/1996 |
| <b>Verified</b>          | SDS        | <b>Test Set Type</b>         | M4100     | <b>Date Retested</b>    |          |
| <b>Verification Date</b> | 4/8/1998   | <b>Set Top Serial #</b>      |           | <b>Reason</b>           | Routine  |
| <b>Last Sheet #</b>      | 34-2M-98   | <b>Test Set Model</b>        | M4100     | <b>Travel Time</b>      |          |
| <b>Purchase Order</b>    |            | <b>Ins. Book #</b>           |           | <b>Duration</b>         |          |
| <b>Copies</b>            |            | <b>Sheet #</b>               | 34-2M-98A | <b>Crew Size</b>        |          |

**Arrester Nameplate**

| Location | Serial # | Manufacturer | Overall Catalog | Unit Catalog | Type | Rated kV | Order |
|----------|----------|--------------|-----------------|--------------|------|----------|-------|
| TOP E    | D26215   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT E    | D26216   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP M    | D26229   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| BOT M    | D26230   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |
| TOP W    | D26231   | Ohio Brass   | 217744          | 215920-3010  | VN   | 74       | 1     |
| MID-B    | D26232   | Ohio Brass   | 217744          | 215920-3075  | VN   | 70       | 3     |

**Bushing Nameplate**

| Designation | Serial # | Manufacturer     | Type | C1 %PF | C1 Cap | C2 %PF | C2 Cap | Rated kV | Amps |
|-------------|----------|------------------|------|--------|--------|--------|--------|----------|------|
| H0          | 1721689  | General Electric | U    | 0.36   | 662    | *      | *      | 23       | 2000 |
| H1          | H24191   | McGraw-Edison    | PA   | 0.52   | 334    | *      | *      | 196      | 1600 |
| H2          | H24190   | McGraw-Edison    | PA   | 0.48   | 334    | *      | *      | 196      | 1600 |
| H3          | H24189   | McGraw-Edison    | PA   | 0.51   | 329    | *      | *      | 196      | 1600 |
| X1          | 1730046  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X2          | 1730045  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |
| X3          | 1730047  | General Electric | A    | *      | *      | *      | *      | 23       | 2000 |

**Bushing Additional Details -H1**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H1        | <b>Voltage</b> Primary   | <b>Serial #</b> H24191   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H2**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H2        | <b>Voltage</b> Primary   | <b>Serial #</b> H24190   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H3**

|                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H3        | <b>Voltage</b> Primary   | <b>Serial #</b> H24189   |                          |
| <b>Catalog #</b> 4B07-T-9053 | <b>Amps</b> 1600 A       | <b>BIL</b> 900 kV        | <b>Tap</b> Y             |
| <b>Class</b>                 | <b>Year</b> 1972         | <b>Drawing</b>           |                          |
| <b>Style</b>                 | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>   |                          |                          |                          |
| <b>Creep Distance</b> *      | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *        | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>                 |                          |                          |                          |
| <b>Flange Dimensions</b>     |                          |                          |                          |
| <b>To Bottom</b> *           | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *              | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                              | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H0**

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H0      | <b>Voltage</b> Primary   | <b>Serial #</b> 2159986  |                          |
| <b>Catalog #</b> 7B550BB   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b> AT25          | <b>Year</b> 1983         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -H4**

|                             |                          |                          |                          |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> H4       | <b>Voltage</b> Primary   | <b>Serial #</b> HC-SN-1  |                          |
| <b>Catalog #</b>            | <b>Amps</b> *            | <b>BIL</b> *             | <b>Tap</b>               |
| <b>Class</b>                | <b>Year</b>              | <b>Drawing</b>           |                          |
| <b>Style</b>                | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b>  |                          |                          |                          |
| <b>Creep Distance</b> 33.50 | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *       | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b> in             |                          |                          |                          |
| <b>Flange Dimensions</b>    |                          |                          |                          |
| <b>To Bottom</b> *          | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *             | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                             | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

**Bushing Additional Details -X1**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X1      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112619 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

**Bushing Additional Details -X2**

|                            |                          |                            |                          |
|----------------------------|--------------------------|----------------------------|--------------------------|
| <b>Designation</b> X2      | <b>Voltage</b> Secondary | <b>Serial #</b> 1000112620 |                          |
| <b>Catalog #</b> UER1      | <b>Amps</b> 12000 A      | <b>BIL</b> 150 kV          | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 2015         | <b>Drawing</b>             |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>         |                          |
| <b>Physical Dimensions</b> |                          |                            |                          |
| <b>Creep Distance *</b>    | <b>Overall Length *</b>  | <b>Inner Seal Dia. *</b>   | <b>Eff. Gnd Sleeve *</b> |
| <b>Total Weight *</b>      | <b>Recess Depth *</b>    | <b>Outer Seal Dia. *</b>   | <b>Slot Size *</b>       |
| <b>Units</b>               |                          |                            |                          |
| <b>Flange Dimensions</b>   |                          |                            |                          |
| <b>To Bottom *</b>         | <b># Bolts *</b>         | <b>Max. Diameters</b>      | <b>Draw Lead</b>         |
| <b>To Top *</b>            | <b>Bolt Size *</b>       | <b>Below Flange *</b>      | <b>Tube ID *</b>         |
|                            | <b>Circle Diameter *</b> | <b>Above Flange *</b>      | <b>To Pin *</b>          |

## Bushing Additional Details -X3

|                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| <b>Designation</b> X3      | <b>Voltage</b> Secondary | <b>Serial #</b> 1621228  |                          |
| <b>Catalog #</b> 1B564G3   | <b>Amps</b> 2000 A       | <b>BIL</b> 150 kV        | <b>Tap</b> Y             |
| <b>Class</b>               | <b>Year</b> 1982         | <b>Drawing</b>           |                          |
| <b>Style</b>               | <b>Other</b>             | <b>S.O. Number</b>       |                          |
| <b>Physical Dimensions</b> |                          |                          |                          |
| <b>Creep Distance</b> *    | <b>Overall Length</b> *  | <b>Inner Seal Dia.</b> * | <b>Eff. Gnd Sleeve</b> * |
| <b>Total Weight</b> *      | <b>Recess Depth</b> *    | <b>Outer Seal Dia.</b> * | <b>Slot Size</b> *       |
| <b>Units</b>               |                          |                          |                          |
| <b>Flange Dimensions</b>   |                          |                          |                          |
| <b>To Bottom</b> *         | <b># Bolts</b> *         | <b>Max. Diameters</b>    | <b>Draw Lead</b>         |
| <b>To Top</b> *            | <b>Bolt Size</b> *       | <b>Below Flange</b> *    | <b>Tube ID</b> *         |
|                            | <b>Circle Diameter</b> * | <b>Above Flange</b> *    | <b>To Pin</b> *          |

## Overall Tests

|                                                     | Insulation        | Test kV | mA    | Watts | PF*TCF [%] | Corr Fctr | Cap (pF) | FRANK™      | Manual |
|-----------------------------------------------------|-------------------|---------|-------|-------|------------|-----------|----------|-------------|--------|
| 1                                                   | CH+CHL            | 10      | 172   | 5     | *          | 0.99      | *        |             |        |
| 2                                                   | CH                | 10      | 37    | 1.44  | 0.390      | 0.99      | *        | Good        |        |
| 3                                                   | CHL<br>(Measured) | 10      | 134   | 3.3   | 0.250      | 0.99      | *        | Investigate |        |
| 4                                                   | CHL               | *       | 135   | 3.56  | 0.260      | 0.99      | *        | Good        |        |
| 5                                                   | CL+CHL            | 7.5     | 250   | 9     | *          | 0.99      | *        |             |        |
| 6                                                   | CL                | 7.5     | 118.4 | 4.6   | 0.390      | 0.99      | *        | Good        |        |
| 8                                                   | CHL               | *       | 131.6 | 4.4   | 0.330      | 0.99      | *        | Investigate |        |
| <b>Winding without Attached Bushing Calculation</b> |                   |         |       |       |            |           |          |             |        |
|                                                     | CH-C1             | CH'     | 30.8  | 1.183 | 0.380      | 0.99      | *        |             |        |

|            |                    |                         |                          |
|------------|--------------------|-------------------------|--------------------------|
| <b>LSR</b> | mA: 86/86, 2/2     | Watts: 5/5, 1/1         | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: 37/37, 1/1     | Watts: 7.2/7.2, 0.2/0.2 | Cap (pF): */*, 100/100   |
| <b>LSR</b> | mA: 67/67, 2/2     | Watts: 3.3/3.3, 1/1     | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*         | Cap (pF): */*, */*       |
| <b>LSR</b> | mA: 25/25, 10/10   | Watts: 4.5/4.5, 2/2     | Cap (pF): */*, 1000/1000 |
| <b>LSR</b> | mA: 59.2/59.2, 2/2 | Watts: 4.6/4.6, 1/1     | Cap (pF): */*, 200/200   |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*         | Cap (pF): */*, */*       |
| <b>LSR</b> | mA: */*, */*       | Watts: */*, */*         | Cap (pF): */*, */*       |



## Bushing Test (C1)

| ID | Serial # | Test kV | mA   | Watts | Corr Fctr | PF*TCF [%] | NP %PF | Cap (pF) | NP Cap | FRANK™ | Manual |
|----|----------|---------|------|-------|-----------|------------|--------|----------|--------|--------|--------|
| H0 | 1721689  | 10      | 2.5  | 0.092 | 1         | 0.370      | 0.36   | 656      | 662    | Good   |        |
| H1 | H24191   | 10      | 1.24 | 0.06  | 1.05      | 0.500      | 0.52   | 328      | 334    | Good   |        |
| H2 | H24190   | 10      | 1.24 | 0.05  | 1.05      | 0.420      | 0.48   | 328      | 334    | Good   |        |
| H3 | H24189   | 10      | 1.22 | 0.055 | 1.05      | 0.470      | 0.51   | 324      | 329    | Good   |        |

|     |                      |                           |                            |
|-----|----------------------|---------------------------|----------------------------|
| LSR | mA: 62/62, 0.02/0.02 | Watts: 6/6, 0.01/0.01     | Cap (pF): 164/164, 2/2     |
| LSR | mA: 62/62, 0.02/0.02 | Watts: 5/5, 0.01/0.01     | Cap (pF): 164/164, 2/2     |
| LSR | mA: 61/61, 0.02/0.02 | Watts: 5.5/5.5, 0.01/0.01 | Cap (pF): 162/162, 2/2     |
| LSR | mA: 25/25, 0.1/0.1   | Watts: 4.6/4.6, 0.02/0.02 | Cap (pF): 65.6/65.6, 10/10 |

## Hot Collar Tests

| ID | Serial # | Test Mode | Skirt # | Standard |    |       | Legacy (GST, optional) |    |       | FRANK™ | Manual |
|----|----------|-----------|---------|----------|----|-------|------------------------|----|-------|--------|--------|
|    |          |           |         | Test kV  | mA | Watts | Test kV                | mA | Watts |        |        |
| X1 | 1730046  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X2 | 1730045  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
| X3 | 1730047  | GND RB    | 6       | 10       | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.008   | *  | *     | *                      | *  | *     |        |        |
|    |          | GND RB    | 4       | 10.022   | *  | *     | *                      | *  | *     |        |        |

|     |              |                 |                    |
|-----|--------------|-----------------|--------------------|
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |
| LSR | mA: */*, 1/1 | Watts: */*, 1/1 | Cap (pF): */*, 1/1 |

## Core Ground Test

|         |   |            |   |
|---------|---|------------|---|
| Voltage | * | Resistance | * |
|---------|---|------------|---|

## Surge Arrester Tests

| Location | Test Mode | Test kV | mA   | Watts | FRANK™       | Manual |
|----------|-----------|---------|------|-------|--------------|--------|
| TOP E    | GND RB    | 10      | 0.27 | 0.076 | Deteriorated |        |
| BOT E    | GND RB    | 10      | 0.3  | 0.084 | Deteriorated |        |
| TOP M    | GND RB    | 10      | 0.28 | 0.076 | Deteriorated |        |
| BOT M    | GND RB    | 10      | 0.3  | 0.086 | Deteriorated |        |
| TOP W    | GND RB    | 10      | 0.28 | 0.074 | Deteriorated |        |
| MID-B    | GND RB    | 10      | 0.3  | 0.084 | Deteriorated |        |

|     |                      |                           |                    |
|-----|----------------------|---------------------------|--------------------|
| LSR | mA: 27/27, 0.01/0.01 | Watts: 38/38, 0.002/0.002 | Cap (pF): */*, 1/1 |
| LSR | mA: 30/30, 0.01/0.01 | Watts: 42/42, 0.002/0.002 | Cap (pF): */*, 1/1 |
| LSR | mA: 28/28, 0.01/0.01 | Watts: 38/38, 0.002/0.002 | Cap (pF): */*, 1/1 |
| LSR | mA: 30/30, 0.01/0.01 | Watts: 43/43, 0.002/0.002 | Cap (pF): */*, 1/1 |
| LSR | mA: 28/28, 0.01/0.01 | Watts: 37/37, 0.002/0.002 | Cap (pF): */*, 1/1 |
| LSR | mA: 30/30, 0.01/0.01 | Watts: 42/42, 0.002/0.002 | Cap (pF): */*, 1/1 |