Company Name
City, State

Thermographic Study
(date)

Prepared By:
L&S Electric, Inc.
PO Box 740
Schofield, WI 54476-0740
April 9, 2012

(Customer Name & Address)

Attn: Customer

Enclosed is a report on the thermographic analysis of electrical equipment performed on (date), at your (city) facility.

The report is broken down into two sections: equipment list and thermographic test points.

The equipment list provides a record of all the equipment scanned. Problem equipment can be readily identified by the presence of an adjacent # character.

At the beginning of the thermographic test point section is located a “Key to Severity” list. This list provides general recommendations and classifications for various temperature rises. The thermographic test point section contains a photograph and thermographic image of problem areas including all specific details.

If you have any questions or comments, please call.

L&S Electric also offers 24-hour electrical/electronic field service, circuit board repair, AC/DC surge & comparison testing, ultrasonic detection, protective relay & switchgear testing.

Sincerely,

L&S ELECTRIC, INC.

Wade Tasche
Certified Thermographer

Kevin Campbell
Power Services Division Manager

wt

NF-CK-#
EQUIPMENT TESTED
(January 17, 2012)

MCC 17
Incoming section
Dehy. tray-off conveyor 1 disconnect
Dehy. product conveyor 2 disconnect
Dehy. product conveyor 3 disconnect
Dehy. product conveyor 4 disconnect
Dehy. product conveyor 5 disconnect
Racetrack feed conveyor 1 disconnect
Racetrack feed conveyor 2 disconnect
Racetrack feed conveyor 3 disconnect
Racetrack feed conveyor 4 disconnect
Racetrack feed conveyor 5 disconnect
Racetrack feed conveyor 6 disconnect
Racetrack feed conveyor 7 disconnect
Racetrack feed conveyor 8 disconnect
Racetrack tray-off conveyor disconnect
Racetrack feed to lines 7, 8 & 9 disconnect
Line 1 & 2 case conveyor 2 disconnect
Line 1 & 2 case conveyor 3 disconnect
Line 1 & 2 case conveyor 4 disconnect
Line 7, 8 & 9 case conveyor 2 disconnect
#1 Line 7, 8 & 9 case conveyor 3 disconnect
#2 Line 7, 8 & 9 case conveyor 4 disconnect
Line 3 & 4 pallet infeed conveyor 1 disconnect
Line 3 & 4 pallet infeed conveyor 2 disconnect
Line 5 & 6 pallet infeed conveyor 1 disconnect
Line 5 & 6 pallet infeed conveyor 2 disconnect
Line 1 & 2 case conveyor 1 disconnect
Line 7, 8 & 9 case conveyor 1 disconnect
Packer 7 take away incline conveyor disconnect
Line 3 & 4 curved plastic box conveyor disconnect
Line 5 & 6 curved plastic box conveyor disconnect
Racetrack 10 disconnect
Racetrack 11 disconnect
EQUIPMENT TESTED
(January 17, 2012)

General Equipment
Case erector 5 & 6 control panels (2)
Case erector 3 & 4 control panels (2)
Case erector 8 & 9 control panels (2)
Case erector 1 & 2 control panels (2)
Line 1 & 2 VFD cabinet

#3 Unit 1 air compressor starter panel
Unit 2 air compressor starter panel

MCC 10
Incoming section
Mixer line 2 disconnect

#4 CR-16 Mixer disconnect
Votator line 2A disconnect
Votator line 2B disconnect
Votator line 1B disconnect
Votator line 1A disconnect
Votator cooling pump line 2 disconnect
Votator cooling pump line 1 disconnect
Holding tank mixer disconnect
Holding tank recirc. pump disconnect
VSP Drive cabinet disconnect
Scrap tank clean-out pump disconnect
Scrap tank recirc./transf. pump disconnect
Scrap tank mixer disconnect
Scrubber recirc. pump disconnect
Kitchen exhaust fan north disconnect
Kitchen exhaust fan center disconnect
Kitchen exhaust fan south disconnect
Tray wash pump disconnect
EQUIPMENT TESTED
(January 17, 2012)

MCC 10 (Lines 1 & 2)
- Incoming section
- Bottom screw line 1 clean-out disconnect
- Bottom screw line 2 clean-out disconnect
- Line 1 tumbler chute conveyor disconnect
- Line 2 tumbler chute conveyor disconnect
- Line 1 accumulator shaker disconnect
- Line 2 accumulator shaker disconnect
- Line 1 distribution shaker disconnect
- Line 2 distribution shaker disconnect
- Packing line 7-8-9 incline feeder conveyor 1 disconnect
- Packing line 7-8-9 incline feeder conveyor 2 disconnect
- Line 1 accumulator shaker dist. feeder disconnect
- Line 2 accumulator shaker dist. feeder disconnect
- 7E disconnect
- Barrel scrap tank recirc. pump disconnect
- Line 1 tumbler 1 feeder disconnect
- Table sweco live bottom bin disconnect
- Line 1 sifter feed elevator disconnect
- Line 2 tumbler 1 feeder (9A) disconnect
- Line 2 tumbler 1 feeder (9B) disconnect
- 9C disconnect
- Line 2 tumbler 2 disconnect
- Line 2 sifter feed elevator disconnect
- Chiller room exhaust fan north disconnect

#5 Sweco sifter disconnect
- Duster feed screw table 1 disconnect
- Duster feed screw table 2 disconnect
- 11A disconnect
- Screw/transf. to surge bin disconnect
- Rotary valve tumbler 3 surge bin disconnect
EQUIPMENT TESTED
(January 17, 2012)

MCC 10 (Lines 1 & 2) cont.
- Chiller room exhaust fan south disconnect
- Screw/sifter to table 1 disconnect
- Screw/sifter to table 2 disconnect
- Gel system tank 1 feed disconnect
- Gel system tank 2 feed disconnect
- Gel system supply screw 1 disconnect
- Gel system supply screw 2 disconnect
- Corn syrup unloader pump disconnect

Cook Kettle & Cooling Tank MCC 05
- Incoming section
  - #6 **Heat tank mixer line 2 disconnect**
  - Heat tank mixer line 1 disconnect
  - Heat tank transfer pump line 1 disconnect
  - Cooling tank transfer pump line 2 disconnect
  - Cooling tank transfer pump line 1 disconnect
  - Cooling tank mixer line 2 disconnect
  - Cooling tank mixer line 1 disconnect

General Equipment
- Power panel PP-2 (MDP-09) (syrup tank hallway west wall)
- Power panel PP-4 (MDP-07) (chiller room east wall)
- Breaker panel MDP-08 (chiller room west wall)
- Breaker panel RCP-09 (chiller room north wall)
- Breaker panel RCP-10 (chiller room north wall)
- Breaker panel RCP-08 (north pack room south wall)
- Breaker panel MDP-06 (boiler room north wall)
- Boiler 1 control panel
- Boiler 2 control panel

Boiler Room Power Panel
- Wexxar area disconnect
- New pack room disconnect
- Ingersoll Rand air compressor disconnect
EQUIPMENT TESTED

(January 17, 2012)

Main Power Distribution Room
- PP-11 disconnect
- PP-12 disconnect
- PP-10 disconnect
- PP-9 disconnect
- PP-2 disconnect
- PP-1 disconnect
- PP-13 disconnect
- Chiller room disconnect

General Equipment
- Control panel PP-9 (silo room north wall)
- Breaker panel MDP-03 (dehy. kitchen MCC hallway west wall)

Power Panel PP1
- MCC 1 disconnect
- MCC 17 disconnect
- Dryer A/C disconnect
- CR 16 Mixer disconnect
- MCC 18 disconnect
- MCC 2 Starch/dryer rooms disconnect
EQUIPMENT TESTED
(January 17, 2012)

MCC 1 (Lines 3 & 4)
Table line 3 dusting starch blower disconnect
Moyno pump disconnect
Votator cooling pump disconnect
Tub pump disconnect
East votator disconnect
West votator disconnect
Holding tank agitator disconnect
Cooling tank agitator disconnect
Cooking kettle agitator disconnect
Scrap tank pump disconnect
Scrap tank agitator disconnect
Kettle exhaust fan disconnect
Cooling tank pump disconnect

General Equipment
Starch blower control panel
Silo motor control panel
Breaker panel RCP-05 (dehy. cook MCC hallway)
EQUIPMENT TESTED
(January 17, 2012)

MCC 18
Line 3 cook kettle mixer disconnect
Line 3 cooling tank mixer disconnect
Line 3 cooling tank discharge pump disconnect
Line 3 holding tank mixer disconnect
Line 3 votator cooling water pump disconnect
Line 3 CR16 mixer disconnect

#7 West votator line 3 disconnect
East votator line 3 disconnect
Line 3 rework tank discharge pump disconnect
Line 3 tumbler 1 infeed Verhalen vibrator disconnect
Line 3 tumbler 3 infeed vibro conveyor disconnect
Line 3 starch receiver live bottom disconnect
Line 3 starch receiver rotary valve disconnect
Line 3 sweco starch filter disconnect
Line 3 table starch feed screw disconnect
Line 3 table bottom starch return screw disconnect
Line 3 kitchen exhaust fan disconnect
Dehy. dust collector bottom screw disconnect
Dehy. dust collector rotary valve disconnect
Dehy. dust collector disconnect
Incoming section
Table dust collector rotary valve disconnect
Table dust collector disconnect
Table dust collector bottom screw disconnect
VSD Cabinet No. 2 disconnect

MCC 18 Room
Drive panel
Breaker panel RCP-11 (south kitchen MCC room)
EQUIPMENT TESTED
(January 17, 2012)

MCC 2
Transformer for LP2 disconnect
Dust collector dock disconnect
VSD Drive cabinet disconnect
Incoming section
Dehy. starch receiver live bottom bin disconnect
Dehy. dusters disconnect
Dehy. starch receiver rotary valve disconnect
Dehy. return starch horizontal screw disconnect
Line 3 tumbler 3 discharge bucket elevator disconnect
Dehy. starch room sweco disconnect
Dehy. return starch incline screw disconnect
Dehy forming table belt disconnect
Dehy. knife disconnect
Dehy. tumbler 1 vibratory infeed disconnect
Dehy. table bottom return starch screw disconnect
Dehy. tumbler 1 discharge bucket elevator disconnect
Line 3 discharge racetrack conveyor 1 disconnect
Line 3 discharge racetrack conveyor 2 disconnect
Line 3 discharge racetrack conveyor 3 disconnect
Dehy. tumbler 2 starch discharge screw disconnect
Dehy. tumbler 2 vibr. discharge conveyor disconnect
Dehy. plastic oven infeed incline conveyor disconnect
Line 3 tumbler 2 vibr. discharge disconnect
Bottom screw dock dust coll. disconnect
Rotary valve dock dust coll. disconnect
Line 3 tumbler 2 disconnect
Line 3 tumbler 1 discharge bucket elevator disconnect
Dehy. tray off conveyor receptacle disconnect
Line 3 tumbler 1 disconnect – not running
Stage A osc. spreader pump disconnect – not running
Stage A osc. spreader belt disconnect – not running
EQUIPMENT TESTED

(January 17, 2012)

MCC 2 (cont.)
Dust collector room exhaust fan east disconnect – not running
Dust collector room exhaust fan west disconnect – not running
Stage B last conveyor disconnect – not running
Stage A circ. fan 1 disconnect – not running
Stage A circ. fan 2 disconnect – not running
Stage A circ. fan 3 disconnect – not running
Stage A circ. fan 4 disconnect – not running
Stage A feed end cross fines screw disconnect – not running
Stage A long fines screw disconnect – not running
Stage B circ. fan 1 disconnect – not running
Stage B circ. fan 2 disconnect – not running
Stage B circ. fan 3 disconnect – not running
Stage B circ. fan 4 disconnect – not running
Stage B circ. fan 5 disconnect – not running
Stage B circ. fan 6 disconnect – not running
Stage B feed end cross fines screw disconnect – not running
Stage B long fines screw disconnect – not running
Stage B cooler circ. fan disconnect – not running
Dryer intake fan outside air disconnect – not running
Dryer end of line conveyor disconnect – not running

MCC 2 Room
Drive panel
Breaker panel RCP-06

Production Area
Main conveyor panel
EQUIPMENT TESTED
(January 17, 2012)

General Equipment (cont.)
- Breaker panel MDP-4 (color room north wall)
- Breaker panel MDP-5 (west loading dock south wall)
- Breaker panel RCP-7 (west loading dock east wall)
- Breaker panel PP-12 (MDP-1) (north pack room south wall)
- Breaker panel PP-1A (MDP-2) (north pack room south wall)
- Breaker panel PP-12B (MDP-10) (north pack room south wall)
- Breaker panel RCP-1 (north pack room south wall)
- Breaker panel PP-12A (RCP-08) (north pack room south wall)
- Breaker panel RCP-4 (maintenance area mezzanine east wall)
- Breaker panel MDP-11 (maintenance area mezzanine north wall)
- Breaker panel RCP-12 (lunchroom janitor’s closet)
- Breaker panel RCP-2 (entrance hallway north wall)
- Breaker panel RCP-3 (entrance hallway north wall)

Key
# Equipment with a problem
# ELECTRICAL

## KEY TO EQUIPMENT SEVERITY

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>TEMP. RISE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine</td>
<td>1°F to 18°F</td>
<td>Corrective measures required at next scheduled maintenance period or as scheduling permits.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>19°F to 36°F</td>
<td>Corrective measures required in the near future on a priority scheduling basis. Check for possible damage to the component.</td>
</tr>
<tr>
<td>Serious</td>
<td>37°F to 54°F</td>
<td>Corrective measures required as soon as possible. Check for damage to component and possible damage to surrounding areas.</td>
</tr>
<tr>
<td>Emergency</td>
<td>Greater Than 54°F</td>
<td>Corrective measures required immediately. Check for damage to component and damage to surrounding areas.</td>
</tr>
</tbody>
</table>
## Thermographic Test Point

<table>
<thead>
<tr>
<th>Problem #</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MCC 17, Line 7,8,9 Case Conveyor 3 Disconnect (bucket 4E)</td>
</tr>
<tr>
<td>Equipment</td>
<td>All 3 Phases Between the Starter &amp; Overload Block Including all Terminations on the Overload Block</td>
</tr>
<tr>
<td>Problem</td>
<td>Loose/Corroded Connections</td>
</tr>
<tr>
<td>Recommended Action</td>
<td>Disassemble, thoroughly clean surrounding termination points and reassemble.</td>
</tr>
</tbody>
</table>

**Date:** 1/17/2012

**Time:** 8:04:08 AM

**Problem Max. Temperature:** 225.3 °F

**Reference Temperature:** 99.4 °F

**Rise:** 125.9

**Severity:** Emergency

### Corrective Action

**Date:**

**Action Taken:**
**Thermographic Test Point**

<table>
<thead>
<tr>
<th>Problem #</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MCC 17, Line 7,8,9 Case Conveyor 4 Disconnect (bucket 4F)</td>
</tr>
<tr>
<td>Equipment</td>
<td>All 3 Phases Between the Starter &amp; Overload Block Including all Terminations on the Overload Block</td>
</tr>
<tr>
<td>Problem</td>
<td>Loose/Corroded Connections</td>
</tr>
<tr>
<td>Recommended Action</td>
<td>Disassemble, thoroughly clean surrounding termination points and reassemble.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>1/17/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>8:04:25 AM</td>
</tr>
<tr>
<td>Problem Max. Temperature</td>
<td>208.3 °F</td>
</tr>
<tr>
<td>Reference Temperature</td>
<td>93.4 °F</td>
</tr>
<tr>
<td>Rise</td>
<td>114.9</td>
</tr>
<tr>
<td>Severity</td>
<td>Emergency</td>
</tr>
</tbody>
</table>

**Corrective Action**

**Date:**

**Action Taken:**
<table>
<thead>
<tr>
<th>Problem #</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>General Equipment, Unit 1 Air Compressor Starter Panel</td>
</tr>
<tr>
<td>Equipment</td>
<td>Right &amp; Center Phases on the Incoming Side of the Far Left Contactor</td>
</tr>
<tr>
<td>Problem</td>
<td>Loose/Corroded Connections</td>
</tr>
<tr>
<td>Recommended Action</td>
<td>Disassemble, thoroughly clean surrounding termination points and reassemble.</td>
</tr>
</tbody>
</table>

**Date**: 1/17/2012  
**Time**: 9:04:11 AM  
**Problem Max. Temperature**: 135.3 °F  
**Reference Temperature**: 86.2 °F  
**Rise**: 49.1  
**Severity**: Serious

**Corrective Action**

**Date:**

**Action Taken:**
Problem # 4
Location MCC 10, CR-16 Mixer Disconnect (bucket 1B)
Equipment Center Phase of the Disconnect Switch, Top Side of the Center Fuse
Problem Loose/Corroded Connections
Recommended Action Disassemble, thoroughly clean contacts on the disconnect switch, fuse and clip. Check for proper clip tension and reassemble.

Date 1/17/2012
Time 8:26:07 AM
Problem Max. Temperature 173.8 °F
Reference Temperature 117.2 °F
Rise 56.6

Severity Emergency

Corrective Action
Date:
Action Taken:
### Thermographic Test Point

<table>
<thead>
<tr>
<th>Problem #</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MCC 10, Sweco Sifter Disconnect (bucket 10B)</td>
</tr>
<tr>
<td>Equipment</td>
<td>Center Phase on the Load Side of the Starter</td>
</tr>
<tr>
<td>Problem</td>
<td>Loose/Corroded Connection</td>
</tr>
<tr>
<td>Recommended Action</td>
<td>Disassemble, thoroughly clean lead termination point and reassemble.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>1/17/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>8:37:39 AM</td>
</tr>
<tr>
<td>Problem Max. Temperature</td>
<td>157.4 °F</td>
</tr>
<tr>
<td>Reference Temperature</td>
<td>116.7 °F</td>
</tr>
<tr>
<td>Rise</td>
<td>40.7</td>
</tr>
</tbody>
</table>

**Severity** | Serious

### Corrective Action

**Date:**

**Action Taken:**
## Thermographic Test Point

<table>
<thead>
<tr>
<th>Problem #</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Cook Kettle &amp; Cooling Tank MCC 05, Heat Tank Mixer Line 2 Disconnect</td>
</tr>
<tr>
<td>Equipment</td>
<td>Top Side of the Left Fuse</td>
</tr>
<tr>
<td>Problem</td>
<td>Loose/Corroded Connection</td>
</tr>
<tr>
<td>Recommended Action</td>
<td>Disassemble, thoroughly clean fuse and clip. Check for proper clip tension and reassemble.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Rise</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.6 °F</td>
<td>112.6 °F</td>
</tr>
<tr>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>95</td>
<td>100</td>
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<tr>
<td>100</td>
<td>105</td>
</tr>
<tr>
<td>105</td>
<td>110</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Date</th>
<th>1/17/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>8:46:33 AM</td>
</tr>
<tr>
<td>Problem Max. Temperature</td>
<td>112.7 °F</td>
</tr>
<tr>
<td>Reference Temperature</td>
<td>92.3 °F</td>
</tr>
<tr>
<td>Rise</td>
<td>20.4</td>
</tr>
</tbody>
</table>

| Severity | Intermediate |

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### Corrective Action

**Date:**

**Action Taken:**

![Thermographic Test Point Image]
**Problem #** | 7  
---|---  
**Location** | MCC 18, West Votator Line 3 Disconnect (bucket 2B)  
**Equipment** | Top Side of the Center Fuse  
**Problem** | Loose/Corroded Connection  
**Recommended Action** | Disassemble, thoroughly clean fuse and clip. Check for proper clip tension and reassemble.

**Date** | 1/17/2012  
**Time** | 9:33:14 AM  
**Problem Max. Temperature** | 147.8 °F  
**Reference Temperature** | 124.7 °F  
**Rise** | 23.0  
**Severity** | Intermediate

**Corrective Action**

**Date:**  
**Action Taken:**
# Summary of Problems

<table>
<thead>
<tr>
<th>Page Number</th>
<th>Location</th>
<th>Rise</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MCC 17, Line 7,8,9 Case Conveyor 3 Disconnect (bucket 4E)</td>
<td>125.9</td>
<td>Emergency</td>
</tr>
<tr>
<td>2</td>
<td>MCC 17, Line 7,8,9 Case Conveyor 4 Disconnect (bucket 4F)</td>
<td>114.9</td>
<td>Emergency</td>
</tr>
<tr>
<td>3</td>
<td>General Equipment, Unit 1 Air Compressor Starter Panel</td>
<td>49.1</td>
<td>Serious</td>
</tr>
<tr>
<td>4</td>
<td>MCC 10, CR-16 Mixer Disconnect (bucket 1B)</td>
<td>56.6</td>
<td>Emergency</td>
</tr>
<tr>
<td>5</td>
<td>MCC 10, Sweco Sifter Disconnect (bucket 10B)</td>
<td>40.7</td>
<td>Serious</td>
</tr>
<tr>
<td>6</td>
<td>Cook Kettle &amp; Cooling Tank MCC 05, Heat Tank Mixer Line 2 Disconnect</td>
<td>20.4</td>
<td>Intermediate</td>
</tr>
<tr>
<td>7</td>
<td>MCC 18, West Votator Line 3 Disconnect (bucket 2B)</td>
<td>23.0</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>