Material Safety Data Sheet
Material Name: Carbon Steel

*** Section 1 - Chemical Product and Company Identification ***
Manufacturer Information
Gerdau Long Steel North America
Phone: (800) 876-3626
4221 West Boy Scout Blvd.
Suite 600
Tampa, FL 33607
Emergency # 800-424-9300 CHEMTREC

*** Section 2 - Hazards Identification ***
Emergency Overview
Fumes may cause irritation of the eyes and respiratory tract.

Potential Health Effects: Eyes
May cause irritation.

Potential Health Effects: Skin
Not considered to cause skin effects. Sensitive individuals may experience skin irritation.

Potential Health Effects: Ingestion
Not considered a route of exposure under anticipated product use conditions.

Potential Health Effects: Inhalation
Inhalation of fumes may cause irritation of the nose, throat and lungs. Chronic irritation may cause bronchitis, pneumonitis, siderosis, upper respiratory tract irritation, headaches, lack of coordination, metal fume fever.

Medical Conditions Aggravated by Exposure
Respiratory conditions may be aggravated by exposure to metal fumes or dusts.

HMIS Ratings: Health: 1 Fire: 0 HMIS Reactivity 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

<table>
<thead>
<tr>
<th>Component</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron oxide</td>
<td>97</td>
</tr>
<tr>
<td>Manganese</td>
<td>2</td>
</tr>
<tr>
<td>Copper</td>
<td>1.5</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>0.9</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.5</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.4</td>
</tr>
<tr>
<td>Tin</td>
<td>0.08</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>0.08</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.06</td>
</tr>
<tr>
<td>Vanadium pentoxide</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*** Section 4 - First Aid Measures ***
First Aid: Eyes
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

First Aid: Skin
For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

First Aid: Ingestion
If the material is swallowed, get immediate medical attention or advice.

First Aid: Inhalation
Move person to non-contaminated air. Seek medical attention.

*** Section 5 - Fire Fighting Measures ***
General Fire Hazards
See Section 9 for Flammability Properties.
Concentrations of metallic fines in the air could present an explosion hazard.
Material Safety Data Sheet

Material Name: Carbon Steel

Hazardous Combustion Products
Above the melting point, iron oxide fumes may be present.

Extinguishing Media
For molten metal, use Class D chemical or sand.

Fire Fighting Equipment/Instructions
Firefighters should wear full protective gear.

NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures
None necessary.

Clean-Up Procedures
Fine particles and small chips should be swept up and disposed of properly.

Evacuation Procedures
Isolate area. Keep unnecessary personnel away.

Special Procedures
User should consult applicable standards for specific process employed to determine any special precautions needed to insure the health and safety of its employees.

*** Section 7 - Handling and Storage ***

Handling Procedures
Avoid contact with skin and eyes. Wash thoroughly after handling.

Storage Procedures
No special storage procedures necessary.

*** Section 8 - Exposure Controls / Personal Protection ***

A: Component Exposure Limits
Iron oxide (1309-37-1)
ACGIH: 5 mg/m3 TWA (respirable fraction)
OSHA: 10 mg/m3 TWA (fume)
NIOSH: 5 mg/m3 TWA (dust and fume, as Fe)

Manganese (7439-96-5)
ACGIH: 0.2 mg/m3 TWA
OSHA: 1 mg/m3 TWA (fume)
3 mg/m3 STEL (fume)
5 mg/m3 Ceiling
NIOSH: 1 mg/m3 TWA (fume)
3 mg/m3 STEL

Copper (7440-50-8)
ACGIH: 0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist, as Cu)
OSHA: 0.1 mg/m3 TWA (dust, fume, mists, as Cu)
NIOSH: 1 mg/m3 TWA (dust and mist)

Carbon dioxide (124-38-9)
ACGIH: 5000 ppm TWA
30000 ppm STEL
OSHA: 10000 ppm TWA; 18000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL
NIOSH: 5000 ppm TWA; 90000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL
Material Name: Carbon Steel

**Nickel (7440-02-0)**
ACGIH: 1.5 mg/m3 TWA (inhalable fraction)
OSHA: 1 mg/m3 TWA
NIOSH: 0.015 mg/m3 TWA

**Silicon (7440-21-3)**
OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

**Tin (7440-31-5)**
ACGIH: 2 mg/m3 TWA
OSHA: 2 mg/m3 TWA
NIOSH: 2 mg/m3 TWA

**Sulfur dioxide (7446-09-5)**
ACGIH: 2 ppm TWA
OSHA: 2 ppm TWA; 5 mg/m3 TWA
NIOSH: 2 ppm TWA; 5 mg/m3 TWA

**Phosphorus (7723-14-0)**
OSHA: 0.1 mg/m3 TWA
NIOSH: 0.1 mg/m3 TWA

**Vanadium pentoxide (1314-62-1)**
ACGIH: 0.05 mg/m3 TWA (dust or fume, respirable fraction)
NIOSH: 0.05 mg/m3 Ceiling (15 min, dust and fume, as V)

**Engineering Controls**
Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces.

**PERSONAL PROTECTIVE EQUIPMENT**

**Personal Protective Equipment: Eyes/face**
Wear safety glasses; chemical goggles for fumes which may arise from thermal processing.

**Personal Protective Equipment: Skin**
Use impervious gloves.

**Personal Protective Equipment: Respiratory**
If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

**Personal Protective Equipment: General**
Eye wash fountain and emergency showers are recommended.

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**Section 9 - Physical & Chemical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Grey metallic</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>NA</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>3000°C (5432°F)</td>
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<td>Solubility (H2O)</td>
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<tr>
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<td>Flash Point Method</td>
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<td>Lower Flammability Limit</td>
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<td>Auto Ignition</td>
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<td>Odor</td>
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<tr>
<td>pH</td>
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<tr>
<td>Vapor Density</td>
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<td>Melting Point</td>
<td>1535°C (2795°F)</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>7.0</td>
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<tr>
<td>VOC</td>
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<td>Flash Point</td>
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<tr>
<td>Upper Flammability Limit</td>
<td>NA</td>
</tr>
<tr>
<td>Burning Rate</td>
<td>NA</td>
</tr>
</tbody>
</table>
Material Safety Data Sheet

Material Name: Carbon Steel

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability
This is a stable material.

Chemical Stability: Conditions to Avoid
None

Incompatibility
Strong Acids

Hazardous Decomposition
Metal fumes if heated. Above the melting point, iron oxide fumes may be present

Possibility of Hazardous Reactions
Will not occur.

*** Section 11 - Toxicological Information ***

Acute Dose Effects

A: General Product Information
Operations or fire which supply sufficient energy to the product (i.e. welding, high speed grinding or melting) can release dust or fumes which may make components of the product biologically available. Exposure to dusts or fumes from some metals including iron, zinc, manganese, chromium, cobalt and copper can produce a condition known as metal fume fever. Iron dust can irritate the eyes and respiratory tract by mechanical action. Acute iron poisoning may involve hemorrhagic vomiting and diarrhea, abdominal pain, acidosis, coagulaopathy, shock, coma and convulsions followed by hepatic and renal failure and perhaps cardiovascular collapse. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis.

Systemic effects from ingestion of nickel include capillary damage, kidney damage, myocardial weakness and central nervous system depression. Allergic skin sensitization reactions are the most frequent effect of exposure to nickel compounds. Exposure to nickel compounds may also result in allergic lung sensitization. Exposure to copper fume or dust can cause respiratory tract irritation, hemolytic anemia and allergic contact dermatitis.

B: Component Analysis - LD50/LC50

Iron oxide (1309-37-1)
Oral LD50 Rat: >10000 mg/kg

Manganese (7439-96-5)
Oral LD50 Rat: 9 g/kg

Nickel (7440-02-0)
Oral LD50 Rat: >9000 mg/kg

Silicon (7440-21-3)
Oral LD50 Rat: 3160 mg/kg

Sulfur dioxide (7446-09-5)
Inhalation LC50 Rat: 2500 ppm/1H

Phosphorus (7723-14-0)
Inhalation LC50 Rat: 4.3 mg/L/1H; Oral LD50 Rat:3.03 mg/kg; Dermal LD50 Rat:100 mg/kg

Vanadium pentoxide (1314-62-1)
Inhalation LC50 Rat: 2.21 mg/L/4H; Oral LD50 Rat:10 mg/kg; Dermal LD50 Rat: >2500 mg/kg

Carcinogenicity

A: General Product Information
The carcinogenic effect of nickel has been well documented in occupationally exposed nickel refinery workers. Lung and nasal cancers were the predominant forms of cancer in the exposed workers.
Material Safety Data Sheet

Material Name: Carbon Steel

B: Component Carcinogenicity

Iron oxide (1309-37-1)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Supplement 7 [1987], Monograph 1 [1972] (Group 3 (not classifiable))

Nickel (7440-02-0)
ACGIH: A5 - Not Suspected as a Human Carcinogen
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 49 [1990], Supplement 7 [1987] (Group 2B (possibly carcinogenic to humans))

Sulfur dioxide (7446-09-5)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 54 [1992] (Group 3 (not classifiable))

Vanadium pentoxide (1314-62-1)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 86 [2006] (Group 2B (possibly carcinogenic to humans))

Teratogenicity
Manganese, copper and nickel have been reported to have adverse reproductive effects in experimental animals. Copper and nickel have been shown to be fetotoxic in experimental animals.

Neurological Effects
Chronic overexposure to manganese compounds may result in CNS effects such as weakness, sleepiness, emotional instability and spastic gait. These effects can be permanent.

Other Toxicological Information
Under normal conditions of handling, the likelihood of inhaling or ingesting amounts necessary for these effects to occur is very small.

*** Section 12 - Ecological Information ***

Ecotoxicity
A: General Product Information
No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Copper (7440-50-8)
Test & Species Conditions
96 Hr LC50 Pimephales promelas 23 µg/L
96 Hr LC50 Oncorhynchus mykiss 13.8 µg/L
96 Hr LC50 Lepomis macrochirus 236 µg/L
72 Hr EC50 Scenedesmus subspicatus 120 µg/L
96 Hr EC50 water flea 10 µg/L
96 Hr EC50 water flea 200 µg/L

Nickel (7440-02-0)
Test & Species Conditions
96 Hr LC50 Oncorhynchus mykiss 31.7 mg/L adult
96 Hr LC50 Pimephales promelas 3.1 mg/L
96 Hr LC50 Brachydanio rerio >100 mg/L
72 Hr EC50 freshwater algae (4 species) 0.1 mg/L
72 Hr EC50 Selenastrum capricornutum 0.18 mg/L
96 Hr EC50 water flea 510 µg/L
Material Safety Data Sheet

Material Name: Carbon Steel

Phosphorus (7723-14-0)
Test & Species Conditions
96 Hr LC50 Lepomis macrochirus 0.0024 mg/L [flow-through]
96 Hr LC50 Brachydanio rerio >100 mg/L [static]
48 Hr EC50 Daphnia magna 0.111 mg/L

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

Component Waste Numbers
Vanadium pentoxide (1314-62-1)
RCRA: waste number P120

Disposal Instructions
Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations. See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

*** Section 14 - Transportation Information ***

US DOT Information
Shipping Name: Not Regulated

TDG Information
Shipping Name: Not Regulated

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: Component Analysis
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Manganese (7439-96-5)
SARA 313: 1.0 % de minimis concentration

Copper (7440-50-8)
SARA 313: 1.0 % de minimis concentration
CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Nickel (7440-02-0)
SARA 313: 0.1 % de minimis concentration
CERCLA: 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Sulfur dioxide (7446-09-5)
SARA 302: 500 lb TPQ
Material Name: Carbon Steel

Phosphorus (7723-14-0)
SARA 302: 100 lb TPQ (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solvent form)
CERCLA: 1 lb final RQ; 0.454 kg final RQ

Vanadium pentoxide (1314-62-1)
SARA 302: 100 lb lower threshold TPQ; 10000 lb upper threshold TPQ
CERCLA: 1000 lb final RQ; 454 kg final RQ

B: Component Marine Pollutants
This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>DOT regulated severe marine pollutant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>Yes</td>
</tr>
</tbody>
</table>

State Regulations
A: General Product Information
Product may be subject to reporting in states other than those listed for individual components.

B: Component Analysis - State
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
<th>RI</th>
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<tbody>
<tr>
<td>Iron oxide</td>
<td>1309-37-1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>124-38-9</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>7446-09-5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>7723-14-0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vanadium pentoxide</td>
<td>1314-62-1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL
The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Minimum Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron oxide</td>
<td>1309-37-1</td>
<td>1 %</td>
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<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>1 %</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>1 %</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>

Additional Regulatory Information
Material Safety Data Sheet

Material Name: Carbon Steel

Component Analysis - Inventory

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>TSCA</th>
<th>CAN</th>
<th>EEC</th>
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</thead>
<tbody>
<tr>
<td>Iron oxide</td>
<td>1309-37-1</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
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<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>124-38-9</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
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<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>7446-09-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>7723-14-0</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Vanadium pentoxide</td>
<td>1314-62-1</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
</tbody>
</table>

*** Section 16 - Other Information ***

Other Information
Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend
ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = NonyDomestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

End of Sheet