SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Ferrous Chloride Solution
CAS Number: 7758-94-3
Synonyms: Spent Pickle Liquor, K062 (only if a waste), spent etch lab acid
Use/Description: Liquid by-product from the Hydrochloric Acid Pickling of Steel or etching of steel

Company Identification:	24 Hour Contact – CHEMTREC 1-800-424-9300
Nucor Steel Arkansas 7301 E. County Road 142 Blytheville, AR 72315	Safety Officer [8:00 am – 5:00 pm]: 1-(870) 762-2100
Nucor Steel Berkeley 1455 Hagan Avenue Huger, SC 29450	Safety Officer [8:00 am – 5:00 pm]: 1-(843) 336-6000
Nucor Steel Decatur 4301 Iverson Boulevard Trinity, AL 35673	Safety Officer [8:00 am – 5:00 pm]: 1-(256) 301-3500
Nucor Steel Gallatin 4831 U.S. Hwy 42 West Ghent, KY 41045	Safety Officer [8:00 am – 5:00 pm]: 1-(859) 567-3100
Nucor Steel Indiana 4537 South Nucor Road Crawfordsville, IN 47933	Safety Officer [8:00 am – 5:00 pm]: 1-(765) 364-1323
Nucor Steel Memphis 3601 Paul R. Lowry Road Memphis, TN 38109	Safety Officer [8:00 am – 5:00 pm]: 1-901-786-5900

For general product information, contact facility as listed above. For emergencies, use the 24 Hour Contact.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
DANGER! CORROSIVE. AVOID SKIN AND EYE CONTACT. CAUSES SERIOUS DAMAGE TO SKIN AND EYES.

OSHA Hazards: Corrosive
Acute Toxicant

GHS Classification: Corrosive to Metals (Category 1)
Acute Toxicity (Category 4)
Eye Damage (Category 1)

Pictogram(s):

Signal Word: Danger

Hazard Statement(s):
H290: May be corrosive to metals
H302: Harmful if swallowed
H318: Causes serious eye damage

Precautionary Statement(s):
P264: Wash thoroughly after handling
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310: Immediately call a POISON CENTER or doctor/physician.

Potential Health Effects

Primary Routes of Exposure
Eye and skin contact, inhalation.

Eye Contact
Corrosive. Can cause redness, pain, blurred vision, severe burns, corneal scarring and blindness.

Skin Contact and Absorption
Corrosive. Can cause burns, irritation, reddening, or burning sensations. No absorption is expected to occur through intact skin.

Inhalation
Inhalation of mists may produce severe respiratory irritation. Inhalation of mists or vapors generated by heating this product may be severely irritating to mucous membranes and respiratory system. Vapor from heating this product is primarily steam, but may contain hydrochloric acid vapors and may cause irritation or damage to throat and upper respiratory tract.

Ingestion
Corrosive. Causes damage to gastrointestinal tract and cardiovascular system following oral exposure.

Chronic or Special Toxic Effects
Hexavalent chromium is categorized as an A1 carcinogen (Confirmed Human Carcinogen) by ACGIH. Cadmium is categorized as an A2 carcinogen (Suspected Human Carcinogen) by ACGIH. Lead is categorized as an A3 carcinogen (Confirmed Animal Carcinogen) by ACGIH. IARC classifies lead as a Group 2B carcinogen (Possibly Carcinogenic to Humans). IARC classifies chromium and hydrochloric acid as Group 3 carcinogens (Unclassifiable as to Carcinogenicity to Humans). Cadmium is on NTP's list of agents, substances, and mixtures of Reasonably Anticipated to Be Human Carcinogens.

Target Organs
Overexposure to specific components of this product may cause adverse effects to the following organs or systems: respiratory system, eyes, skin, gastrointestinal tract, and cardiovascular system.

Medical Conditions Aggravated by Exposure
Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc) may be adversely affected by low level exposures.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Hydrochloric Acid	(HCl)	7647-01-0	1-10%	5 ppm	(Ceiling)	5 ppm	(Ceiling)
Iron	(Fe)	1309-37-1	8-17%	5	Fe_2O_3 Dust and Fume	10	Fume

Exact specifications for specific products may be available upon request.

4. FIRST AID MEASURES

Eye Contact
Immediately flush eyes with plenty of water, for at least 20 minutes. Lift the upper and lower lids occasionally. Obtain medical attention immediately.
Skin Contact
Flush skin with plenty of water, for at least 20 minutes. If there is widespread contamination, remove contaminated clothing under safety shower and wash exposed areas with soap and large quantities of water. Obtain medical attention immediately. Launder contaminated clothing before reusing.
Inhalation
If symptomatic, move to fresh air. Perform artificial respiration, if necessary, and obtain medical attention immediately. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Ingestion
Rinse mouth. DO NOT INDUCE VOMITING. Give plenty of water to drink. Obtain medical attention immediately.
Other
Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

5. FIRE FIGHTING MEASURES

Flash Point (Method): Not available
Flammable Limits (% volume in air): Not available
Auto ignition Temperature: Not available
Extinguishing Media
Small Fires—Dry chemical, dry sand, alcohol resistant foam, or CO_2.
Large Fires—Alcohol-resistant foam, water fog, or water spray (not water streams). Move containers from fire area if safe to do so. Dike fire control water for later disposal; do not scatter the material.
Fire involving tanks or car/trailer loads—Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from ends of tanks. ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2) mile in all directions.
Special Fire Fighting Procedures: Exposure to unknown concentrations of fumes or mists requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus.
Unusual Fire or Explosion Hazards: None known

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released: Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leaks if safe to do so. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas.

7. HANDLING AND STORAGE

Store in drums or tanks that are designed to withstand low pH corrosive liquids. Store in well-ventilated, cool, dry places away from strong bases and sources of heat and ignition. Ground all transfer equipment. Use confined space entry procedures when entering vessels that have contained spent pickle liquor. Do not use air pressure or apply heat with open flame to remove spent pickle liquor from drums. "Empty" drums may retain solid, liquid, and/or vapor residues. Continue to observe all precautions on label as if empty drum were full. Do not cut, puncture, torch, or weld on or near the emptied drum. Do not use drum for other purposes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection
Wear chemical goggles or face shield when the risk of splashing is present.
Skin
Wear polyvinyl chloride (PVC), natural rubber, neoprene, butyl rubber, viton, nitrile or polyvinyl alcohol (PVA) gloves and protective clothing appropriate for the risk of exposure. Structural firefighters' protective clothing will only provide limited protection.
Respiratory Protection
When potential exposures are above the occupational limits shown in Section 3, approved respirators must be used as specified by an industrial hygienist or other qualified professional. Respirator users must be medically evaluated to determine if they are physically capable of wearing a respirator. Quantitative and/or qualitative fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use. Users of any style respirator must be clean shaven on those areas of the face where the respirator seal contacts the face. Exposure to unknown concentrations of vapors or mists requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus. Pressure-demand airline respirators are recommended when performing jobs with high potential exposures such as entering vessels that have contained spent pickle liquor.
Ventilation and Engineering Controls
Good ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Supplementary local exhaust ventilation may be needed in some circumstances. Ventilation equipment should be checked regularly to ensure it is functioning properly.
Recommended Decontamination Facilities
Eye wash, washing facilities, and safety shower.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Brown liquid
Boiling Point: Not available
Melting Point: Not available
pH: <2
Specific Gravity (at 15.6ºC): 1.18-1.40
Density (at 15.6 ºC): Not available

Vapor Pressure: Not available
Vapor Density (air = 1): Not available **%**
Volatile, by Volume: Not available
Solubility in Water: Infinite.
Evaporation Rate (Butyl Acetate = 1): Not available **Other**
Physical and Chemical Data: None

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions
Conditions to Avoid: May react violently with bases. Reactions with metals can release flammable hydrogen gas. Hydrogen chloride can react with cyanide, forming lethal concentrations of hydrocyanic acid.
Incompatibility (Materials to Avoid): Bases, mercuric sulfate, perchloric acid, carbides of calcium, cesium, rubidium, acetylides of cesium and rubidium, phosphides of calcium and uranium and lithium silicide.
Hazardous Decomposition Products: Oxides of iron, chrome, lead and cadmium may be formed.

11. TOXICOLOGICAL INFORMATION

The ACGIH Threshold Limit Value for iron oxide was set in order to prevent the development of x-ray changes in the lung from long-term exposure. These changes are not considered to be associated with any physical impairment of lung function. This deposition and collection of iron, which is responsible for the x-ray changes noted above, is called siderosis and is considered benign. Iron oxide dust and fumes are categorized as A4 carcinogens (Not Classifiable as a Human Carcinogen) by ACGIH.

Acute poisoning from cadmium oxide-containing fumes has resulted in delayed effects (4-10 hours) of shortness of breath and cough. There could be a burning sensation, tightness, or pain in the chest. Symptoms of metal fume fever are possible. Acute pulmonary edema may develop 24 to 48 hours after exposure; in other cases only rales may be heard. Decreased FVC (forced vital capacity) and FEV_1 (forced expiratory volume during the first second) are found, and carbon monoxide diffusion capacity may be reduced. In mild cases, the symptoms are resolved over a week's time. In severe cases, the shortness of breath is progressive, leading to death (characteristically within the first week after exposure).

Chronic effects of cadmium exposure have been reported to the kidneys, liver, and lungs (emphysema), have been reported. The ACGIH has designated cadmium as a suspected human (A2) carcinogen. The criteria for A2 carcinogens are that the agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histological type(s), or by mechanism(s) that are considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

Hydrochloric acid, when inhaled, may cause irritation of the respiratory tract with burning, choking, and coughing. Severe breathing difficulties may occur, which may be delayed in onset. At times ulceration of the nose and throat may occur. Hydrochloric acid may cause eye irritation, severe burns, and permanent damage with loss of sight. Solutions of hydrochloric acid may cause severe burns of the skin. Repeated or prolonged exposure to hydrochloric acid may cause erosion of the teeth and/or dermatitis.

Chromium occurs in two commercially important valence states, tri- and hexavalent. There are two trivalent compounds (chromic oxide and chromic sulfate) and several hexavalent compounds (including chromium trioxide, chromic acid, and dichromate salts of sodium, potassium and other metals). Trivalent chromium compounds have low toxicity. Hexavalent chromium compounds are irritants and corrosive. Inhalation of high concentrations of hexavalent compounds produces coughing, wheezing, pain on inspiration, fever, loss of weight, and may cause pneumonitis. Skin contact can cause severe local irritation and corrosion. Chronic

exposure to nonrespirable chromium dust can produce lesions in the upper respiratory system, eye lesions, and asthma in some individuals. Pneumoconiosis is also possible. Skin exposure to coarse mists and splashes can produce ulcers. Dermatitis is common to compounds of both chromium valence states. The ACGIH has designated hexavalent chromium compounds as confirmed human (A1) carcinogens. Chromium metal and trivalent chromium compound have been designated as A4 carcinogens (Not Classifiable as a Human Carcinogen) due to lack of data. IARC classifies chromium as a Group 3 carcinogen (Unclassifiable as to Carcinogenicity to Humans).

Lead poisoning is essentially a chronic disease, caused by gradual accumulation. At high levels of exposure, toxic levels may accumulate within days or weeks. Organs that are particularly sensitive to lead exposure are the hemapoietic system, kidneys and the central nervous systems. Joint pain and gastrointestinal symptoms, such as anorexia, nausea, weight loss, and abdominal discomfort, are also common. Male and female reproductive effects are also possible.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data
This material is toxic to fish and wildlife. Do not discharge into lakes, streams, ponds, etc.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with federal, state, and local health and environmental regulations. Material may be considered an EPA listed waste (K062).

14. TRANSPORT INFORMATION

DOT Proper Shipping Name: Ferrous Chloride, solution
DOT Hazard Class: 8
UN/NA Number: NA1760
DOT Packing Group: II
Labeling Requirements: Required
Placards: Required

15. REGULATORY INFORMATION

NOTE: The regulatory information contained in this Safety Data Sheet (SDS) is not intended to be comprehensive.

California Proposition 65:

⚠ **WARNING:** This product can expose you to chemicals including chromium, cadmium and lead which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Massachusetts Substance List: Cadmium, Chromium, Hydrochloric acid, Iron chloride, Lead, Manganese
Pennsylvania Hazardous Substance List: Cadmium, Chromium, Hydrochloric acid, Iron chloride, Lead, Manganese
New Jersey Hazardous Substance List: Cadmium, Chromium, Hydrochloric acid, Iron chloride, Lead, Manganese

The Resource Conservation and Recovery Act (RCRA)

Product is a RCRA listed Hazardous Waste (K062).

Toxic Substances Control Act (TSCA)
Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
Unpermitted releases in excess of 10 pounds must be reported to the National Response Center.

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect

This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):

SECTION 313 REPORTABLE INGREDIENTS BASED ON NORMAL PRODUCTS:

Chemical Name	CAS Number	Concentration (% by weight)
Hydrochloric Acid	7647-01-0	<10
Lead	7439-92-1	0.0-0.011

16. OTHER INFORMATION

Disclaimer of Liability

Legally required information is given in accordance with applicable OSHA regulations. Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user and WE EXPRESSLY DISCLAIM ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. Nothing is intended as a recommendation for uses, which infringe valid patents, or as extending any license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users. Use or retransmission of the information contained herein in any other format than the format as presented is strictly prohibited. Nucor neither represents nor warrants that the format, content or product formulas contained in this document comply with the laws of any other country except the United States of America.