Wastewater - Construction Permit Application Wastewater Facilities - Industrial (D-1970)

version 2.0

(Submission #: HP2-T98H-QZJ1V, version 1)

Details

Submission ID	HP2-T98H-QZJ1V
Submission Reason	New
Status	Submitted

Fees

Fee	$800.00
Payments/Adjustments	$0.00
Balannce Due	$800.00 (Due)

Form Input

Submittal Details

Is this a Delegated Review Project submittal?
No

Will the flow from this project go to a POTW?
No

Project Name
Haile Gold Mine Contact Wastewater Treatment Facility

Project Description - Wastewater
See Attached

Specific Wastewater Project Type
WWTF Upgrade (modification)

Initial Owner

Initial Owner [Time of Application]

Prefix
NONE PROVIDED

First Name	Last Name
NONE PROVIDED	*NONE PROVIDED*

Title
NONE PROVIDED

Organization Name
Haile Gold Mine

Phone Type	Number	Extension
Business	803-475-1220	

Email
scott.mcdaniel@oceanagold.com

Fax
NONE PROVIDED

6911 Snowy Owl Road
Kershaw, SC 29067
USA

Is the final owner the same as the initial owner?
Yes

Additional Contacts

Entity Responsible for Final Operation & Maintenance of System - Wastewater

Prefix
NONE PROVIDED

First Name	Last Name
NONE PROVIDED	*NONE PROVIDED*

Title
NONE PROVIDED

Organization Name
Haile Gold Mine

Phone Type	Number	Extension
Business	803-475-1220	

Email
scott.mcdaniel@oceanagold.com

Fax
NONE PROVIDED

6911 Snowy Owl Road
Kershaw, SC 29067
USA

Design Engineer

Prefix
NONE PROVIDED

First Name	Last Name
Sam	*Billin*

Title
NONE PROVIDED

Organization Name
HAILE GOLD MINE INC

Phone Type	Number	Extension
Business	775-777-8003	

Email
Sam.Billin@linkan.biz

Fax
NONE PROVIDED

2720 Ruby Vista Drive
Elko, NV 89801
US

S.C. Registration Number (Design Engineer):
38192

Is the Construction Engineer the same as the Design Engineer?
Yes

Are there additional design engineers?
No

LLR Licensing Lookup
Engineers and Land Surveyors - Licensee Lookup

Wastewater Facility Contact

First Name	Last Name
Scott	*McDaniel*

Title
Environmental Manager

Organization Name
OceanaGold - Haile Operation

Phone Type	Number	Extension
Business	803-475-2943	

Email
scott.mcdaniel@oceanagold.com

6911 Snowy Owl Road
Kershaw, SC 29067
USA

Site Information

Project Location
6911 Snowy Owl Road
Kershaw, SC 29067

Site County
Lancaster

Site Location
34.59853929669307,-80.5346581541842

Project Details

Is this project part of a phased project?
No

Is this project a revision to a previously permitted project?
Yes

Permit Number
SC0040479

Date Approved
12/01/2013

Project Name (if different)
NONE PROVIDED

Is this application being submitted based on an Order issued by DHEC?
No

Is this application being submitted based on a Schedule of Compliance issued by DHEC?
No

Will this project cross a waterbody (e.g. river, creek)?
No

Are Wastewater Standard Specifications approved by the Department being used by this project?
No

Wastewater Systems

Wastewater System Types
Process/Industrial

Project Average Design Flow
For domestic contributions to wastewater projects, this is based on Reg. 61-67, Appendix A. For other projects, the flow is determined based on design capacity of the component(s) being installed. If the treatment system has already accounted for the flow, the flow for the project will be zero (0). Calculations should be submitted to document the flow.

Project Average Design Flow (GPD)
1728000

Treatment System Average Design Flow (GPD)
Provide the average design capacity of the treatment plant in gallons per day (GPD).

Treatment System Average Design Flow (GPD)
1728000

Name of Facility Treating the Wastewater
NONE PROVIDED

NPDES/ND Number of Facility
NONE PROVIDED

Has a Preliminary Engineering Report already been approved for this project?
No

Was a NPDES/ND application submitted?
No

Disposal Sites

Effluent Disposal Site (Description)	Sludge Disposal Site (Description)
Haile Gold Mine	Tailing Storage Facility

Required Documents

Standard Submittal

The below items must be included along with a Standard Submittals. These items should be uploaded using the attachment tool.

1) A transmittal letter outlining the submittal package.

2) The signed and sealed plans and the construction specifications. Specifications may be omitted if approved standard specifications are already on file with DHEC.

3) One (1) set of the appropriate design calculations (e.g., flow calculations, pump station calculations, pump curve, etc.).

4) Construction easements, unless the project owner has the right of eminent domain.

5) A letter(s) from the entity providing wastewater treatment stating their willingness and ability to serve the project, (state the flow, number of lots, etc.), including pretreatment permits, if applicable.

6) A letter(s) from the entity agreeing to be responsible for the operation and maintenance (O&M) of the systems.

NOTE: Other approvals may include 208 (wastewater only) and OCRM CZC Certification, and navigable waterway permitting. To expedite the project review, the 208 and OCRM CZC Certification may be included with the project submittal.

One hard copy of signed and sealed plans must also be submitted.

Required Documents

CWTP 2020 Application_09102020.pdf - 09/16/2020 10:32 AM

Comment

NONE PROVIDED

Signatures

Signature Instructions

Applications. All permit applications shall be signed as follows:
(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
(i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or
(ii) The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
(3) For a municipality, State, Federal, or other public agency or public facility: By either a principal executive officer, mayor, or other duly authorized employee or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:
(i) The chief executive officer of the agency, or
(ii) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator, Region IV, EPA).

This application must be certified by the owner, the design engineer(s) and the construction/certifying engineer responsible for this project. A signature page may be obtained through the below link and attached.
Signature Page

Signature
CWTP DHEC1970 signed.pdf - 09/16/2020 10:47 AM
Comment
NONE PROVIDED

Fees

Sewer Systems (DRP)
No

Sewer System
Not Applicable

ONLY identify one design flow for fee purposes.

Treatment Systems < 1.0 MGD
Not Applicable

Treatment Systems >/= 1.0 MGD
Expansion

Pretreatment System
Not Applicable

Fees

Treatment Systems >/= 1.0 MGD: Expansion
800

Total Fee
800

Status History

	User	Processing Status
9/16/2020 10:09:35 AM	Scott McDaniel	Draft
9/16/2020 10:49:08 AM	Scott McDaniel	Submitted

OCEANAGOLD
Haile Operation

September 10, 2020

Byron Amick
S.C. Dept. of Health and Environmental Control
NPDES Administration Section
2600 Bull Street
Columbia, SC 29201

RE: Construction Application for Modifications to Contact Wastewater Treatment Plant (CWTP)
NPDES Permit Number SC0040479

Dear Mr. Amick:
Enclosed are the construction documents required for modifications to the Contact Wastewater Treatment Plant (CWTP) under NPDES Permit Number SC0040479.

In compliance with the regulations outlined in the NPDES regulations, please find enclosed:

a) Cooling Water Intake Disclosure Statement (below)
b) EPA Form 3510-2C (8-90) Application for Permit to Discharge Wastewater
c) Process Description (stamped by Sam Billin - SC Licensed PE - 38192)
    a. Description
    b. Reagent Dosing Details
    c. Flow Diagrams
    d. P&ID Diagrams
    e. SDS Sheets on Reagents
d) NPDES Effluent Limits
e) EPA Form 3510-1 (8-90) General Information Statement
f) EPA Form 3510-2D (8-90) New Sources and New Discharge Locations
g) DHEC Bureau of Water Sludge Disposal Statement
h) DHEC Bureau of Water Location Statement
i) Mixing Zone Request for Surface Water Discharges

Cooling Water Intake Disclosure Statement:
Haile Gold Mine does not use or intake cooling water into the Contact Wastewater Treatment process.

If you have any questions, please contact me at 803 475-1220 or scott.mcdaniel@oceanagold.com.

Sincerely,

Scott McDaniel
Environmental Manager

cc. Anastasia Shaw
File

OCEANA GOLD

ENGINEERING DESIGN CHANGES

STAGE 0

Prepared for:

OCEANAGOLD
HAILE OPERATION

August 2020

Prepared by:

Linkan ENGINEERING
2720 Ruby Vista Drive
Suite 101
Elko, NV 89801
775.777.8003

Planning · Design · Procurement · Construction · Operation

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

CWTP	Contact Water Treatment Plant
Fe	Iron
gpd	Gallons per Day
$KMnO_4$	Potassium Permanganate
MF	Microfilter
mg/L	Milligrams per Liter
Mn	Manganese
$NaMnO_4$	Sodium Permanganate
NaOCl	Sodium Hypochlorite
PFD	Process Flow Diagram
pH	Hydrogen Potential
s.g.	Specific Gravity
s.u.	Standard Units
Tl	Thallium
TSS	Total Suspended Solids

1.0 INTRODUCTION

This report will address the proposed changes and will be presented with the following structure:

Section 1 – Presents a discussion of the proposed changes.

Section 2 – Presents the proposed process description.

Section 3 – Presents the chemical dosing requirements.

Section 4 – Presents process-associated drawings.

Section 5 – Presents SDS sheets for all chemicals that are proposed for use.

1.1 Discussion

This report presents proposed changes to the Oceana Gold Haile CWTP in support of their initiative to reduce thallium (Tl) levels in their plant discharge. These changes are based upon bench-scale tests that were performed in June 2020 by Linkan Engineering (Linkan) on the CWTP feed water, the results of which were very favorable.

The tests included oxidation of the water by chemical means for iron (Fe) and manganese (Mn) removal, and this mechanism proved beneficial in the removal of Tl. Oxidation of aqueous Fe and Mn is an electrochemical process in which each metal reacts with oxygen occurring either naturally or as a chemically bound form. This reaction between the metal and the oxygen forms a hydrated species. This occurs in a 2-step mechanism in which there is an anodic dissolution of the aqueous metal, which loses electrons and becomes ionic and soluble in water. This is then followed by a cathodic reduction of oxygen, where it reacts with water and the available electrons lost from the metal, and this reaction yields hydroxide ions. These hydroxide ions then react with the metal ions and form metal hydroxides, which eventually become super-saturated in solution and begin to precipitate out as solid masses. This precipitation, especially of Mn, provides Tl removal through co-precipitation mechanisms including inclusions, occlusions, and adsorptions into the forming crystal structures. These precipitated masses can then be removed via sedimentation and filtration, both of which the Haile CWTP has in current operation.

The oxidant proposed for use is sodium hypochlorite (NaOCl), with either potassium permanganate ($KMnO_4$) or sodium permanganate ($NaMnO_4$) being appropriate substitutions, as determined by the bench-scale test results. Each of these chemicals will have residuals controlled by way of the addition of a reducing agent, with sodium metabisulfite being proposed due to its high efficiency to neutralize these oxidants and thereby safeguard downstream ecosystems from their effects. The treatment for Tl at the Haile CWTP is based upon the aforementioned chemical processes, the details of which are included in the following sections of this report:

2.0 PROCESS DESCRIPTION

The proposed Haile CWTP water treatment process is described in the following section. It should be noted that all of the proposed treatment components have been used successfully on an industrial scale for the contaminants of concern noted at the Haile facility, with none of them being novel or experimental in any way. The science behind each proposed component is well understood and has been validated over years of application in facilities worldwide.

Influent to the process will be obtained at the discharge of the plant feed pond (Pond A-19), at which point it is proposed that sodium hypochlorite will be introduced into the plant feed piping at a dose of 15 - 25 mg/L. This chemical will ideally be injected just upstream of the CWTP feed water delivery pump, and therefore use the pump energy to efficiently disperse the chemical into the feed water.

Calcium hydroxide (slaked lime) will be introduced into the Stage 1 Reaction Tank to maintain a pH of 8.7 plus or minus 0.2 standard units (s.u.). Ferric chloride will also be added as a coagulant into the Stage 1 Reaction Tank at a dose of 15 mg/L to provide available iron to form hydrous ferric oxide (HFO) floc.

The water will then be conveyed via gravity transfer into the Stage 1 MultiFlo unit where some sedimentation will occur of the precipitated species. The supernatant will then be conveyed via gravity to the Second Stage Reaction Tank where a precipitant chemical will be administered. The proposed precipitant is an organo-sulfide chemical manufactured by Evonik Industries that has been labeled with the trade name of 'TMT-15'. This product forms sulfide-metal bonds, which chelate the metals out of solution. Specifically, it is a trimercaptotriazine that has a cyclic structure affording it its stability, and which also imparts its eco-friendly qualities, as it does not degrade and remobilize toxic metals or form harmful decomposition byproducts. The cyclic structure of the molecule has 3 equidistantly spaced sulfide atoms instead of the single atom in most other inorganic and organic precipitant chemicals, which allows it to be a more efficient metal scavenger, per equivalent dose, than its industry counterparts.

Once again, the water is conveyed via gravity, entering the Lamella Clarifier where it is proposed to be injected with approximately 4 mg/L of high molecular weight, an anionic polymer that will agglomerate a significant amount of the remaining precipitated masses. These agglomerates will form 3-dimensional structures of increasing size, whereupon at a certain size gravity will act upon them and they will settle out of solution as governed by Stoke's Law.

Gravity transfer then conveys the water to the Second Stage Clearwell, where it is proposed that sodium metabisulfite is added to neutralize any residual oxidant that was not consumed in the treatment reactions. The effectiveness of this oxidant quench can be monitored by residual free chlorine testing.

A pump will convey the water to the microfiltration (MF) units that will remove the remaining total suspended solids (TSS). Filtrate water will enter the system Backwash Tank and once it is full will flow into the pH Adjustment Tank, where depending on the regulatory requirements; either acid or base will be

added before the water flowing via gravity to the Discharge Pump Box. The treated water will then be pumped to discharge Outfall 003

Solid waste handling will be maintained in the same way as the currently permitted process, with underflow from the Multiflo and the Lamella clarifiers being directed to the Sludge Transfer Box where it will be sent to the Cyanide Recovery Thickener Box, or the Process Events Pond. Liquid waste from routine periodic reverse flushes of the MF units and all MF chemical cleaning events will be directed to the plant's sump where it will be returned to Pond A-19.

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3.0 CHEMICAL DOSING REQUIREMENTS

It is anticipated that the Haile CWTP will operate at an average of 1,200 gpm. The following are the chemical dosing requirements for this flow:

3.1 Sodium Hypochlorite

15 mg/L of 12.5 percent by weight solution and specific gravity (s.g.) of 1.17 will require that 7.38 gallons per hour (177.2 gpd) are pumped into the CWTP feed water.

3.2 Calcium Oxide (Quick Lime)

The demand for anhydrous calcium oxide was determined via titration to be approximately 350 mg/L. It is anticipated that the hydrated equivalent will be used in the process for pH control of the First Stage Reaction Tank.

3.3 Ferric Chloride

15 mg/L of 12.5 percent by weight solution and an s.g. of 1.42 will require that 1.9 gallons per hour (45.6 gpd) are pumped into the CWTP First Stage Reaction Tank.

3.4 TMT-15

5 mg/L of 1 percent by weight solution and an s.g. of 1.1375 will require that 0.633 gallons per hour (15.2 gpd) are pumped into the CWTP Second Stage Reaction Tank.

3.5 Polymer

4 mg/L of 30 percent by weight solution and an s.g. of 1.1 will require that 0.873 gallons per hour (20.95 gpd) are pumped into the CWTP Second Stage Lamella Clarifier.

3.6 Sodium Metabisulfite

A projected dose of 1 mg/L of 40 percent by weight solution and an s.g. of 1.33 will require that 0.135 gallons per hour (3.2 gpd) are pumped into the CWTP Second Stage Clearwell.

4.0 DRAWINGS

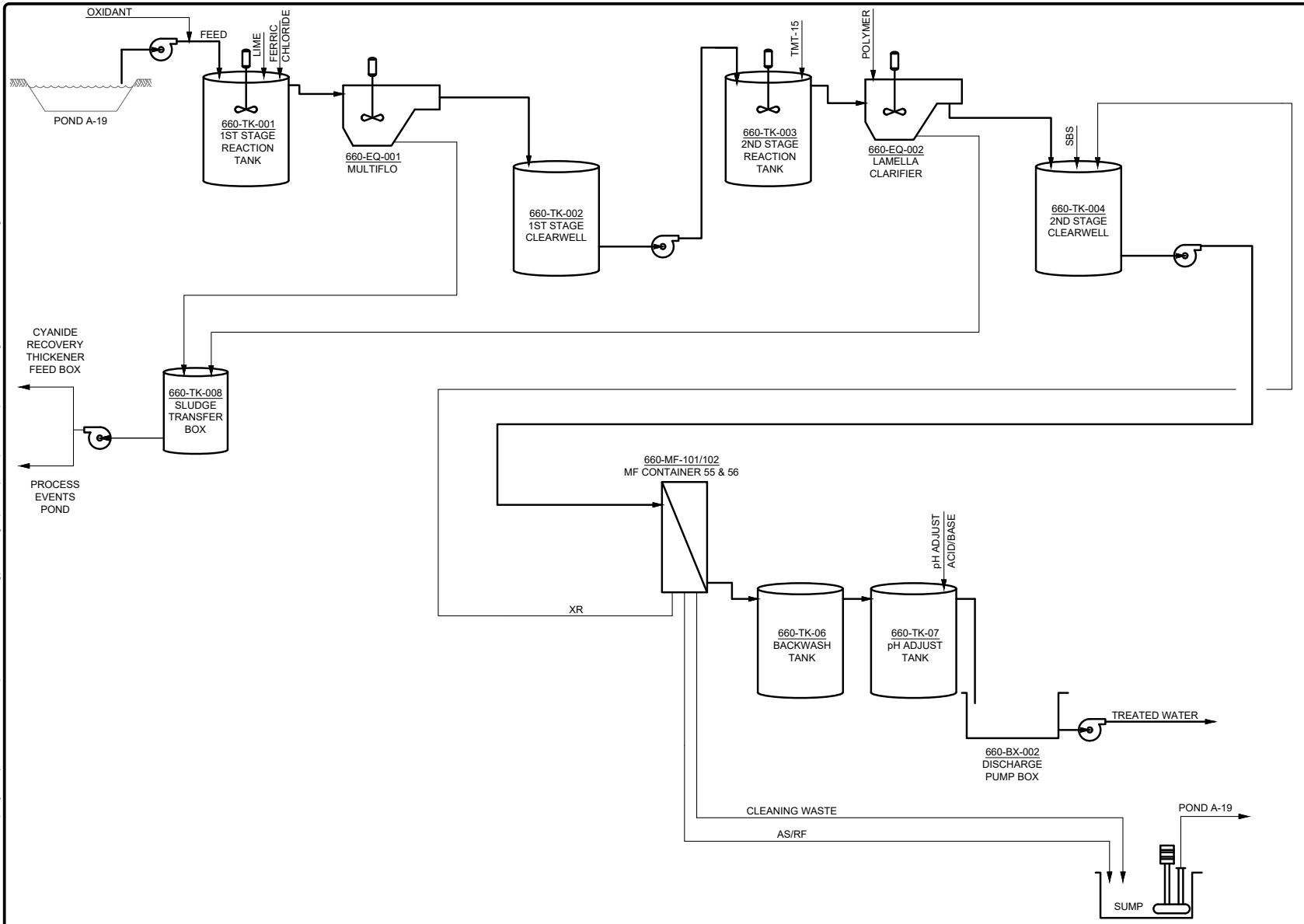
Refer to Appendix A for the proposed process flow diagram (PFD).

5.0 SDS SHEETS

Refer to Appendix B for applicable SDS sheets.

APPENDIX A

DRAWINGS



Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-3003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT PROCESS FLOW DIAGRAM

PROJECT: HAILE GOLD PROJECT WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. G-200

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 38192 SAMUEL BILLIN

08/05/2020

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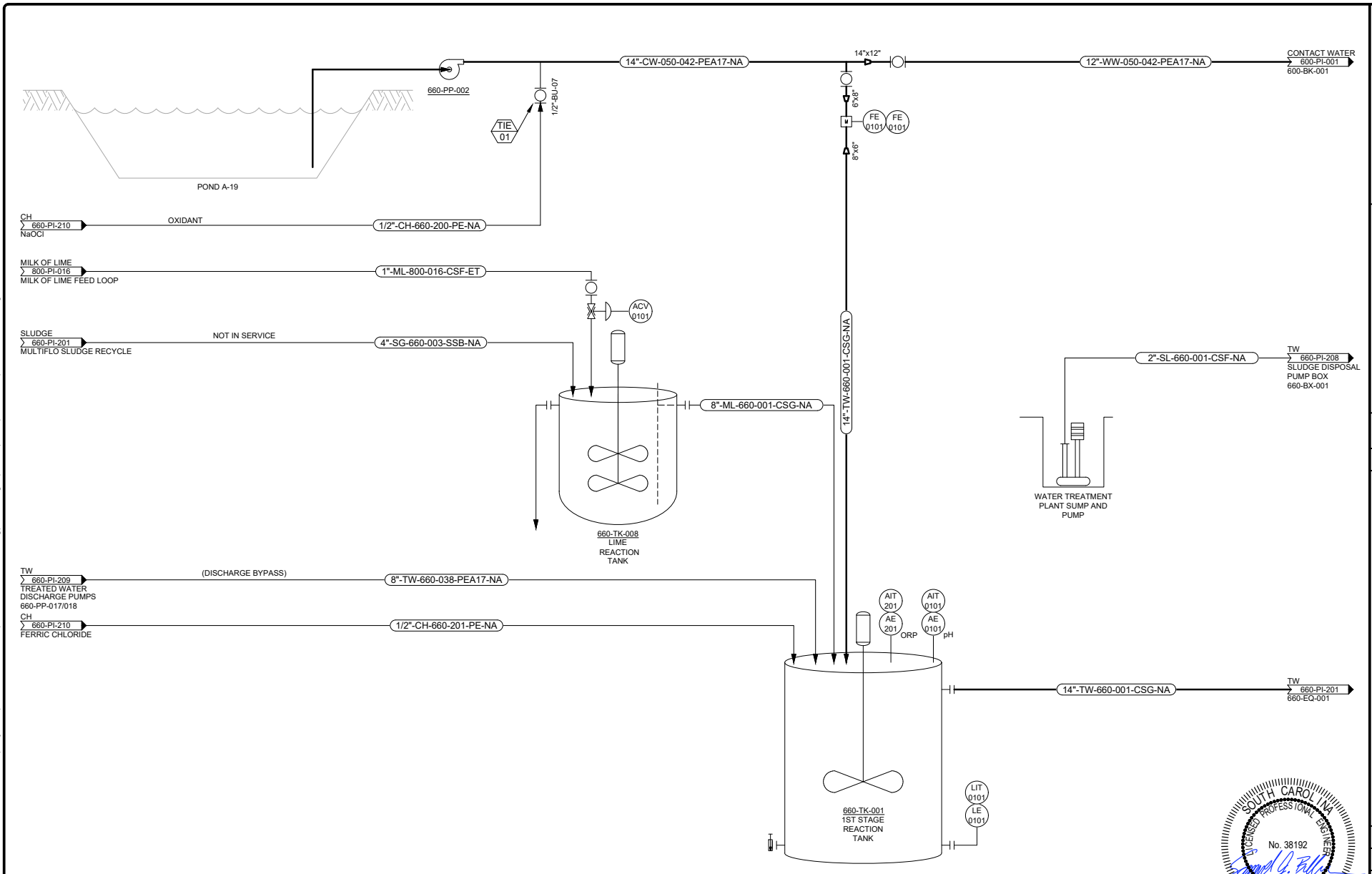

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2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

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1ST STAGE REACTION TANK
LIME REACTION TANK

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

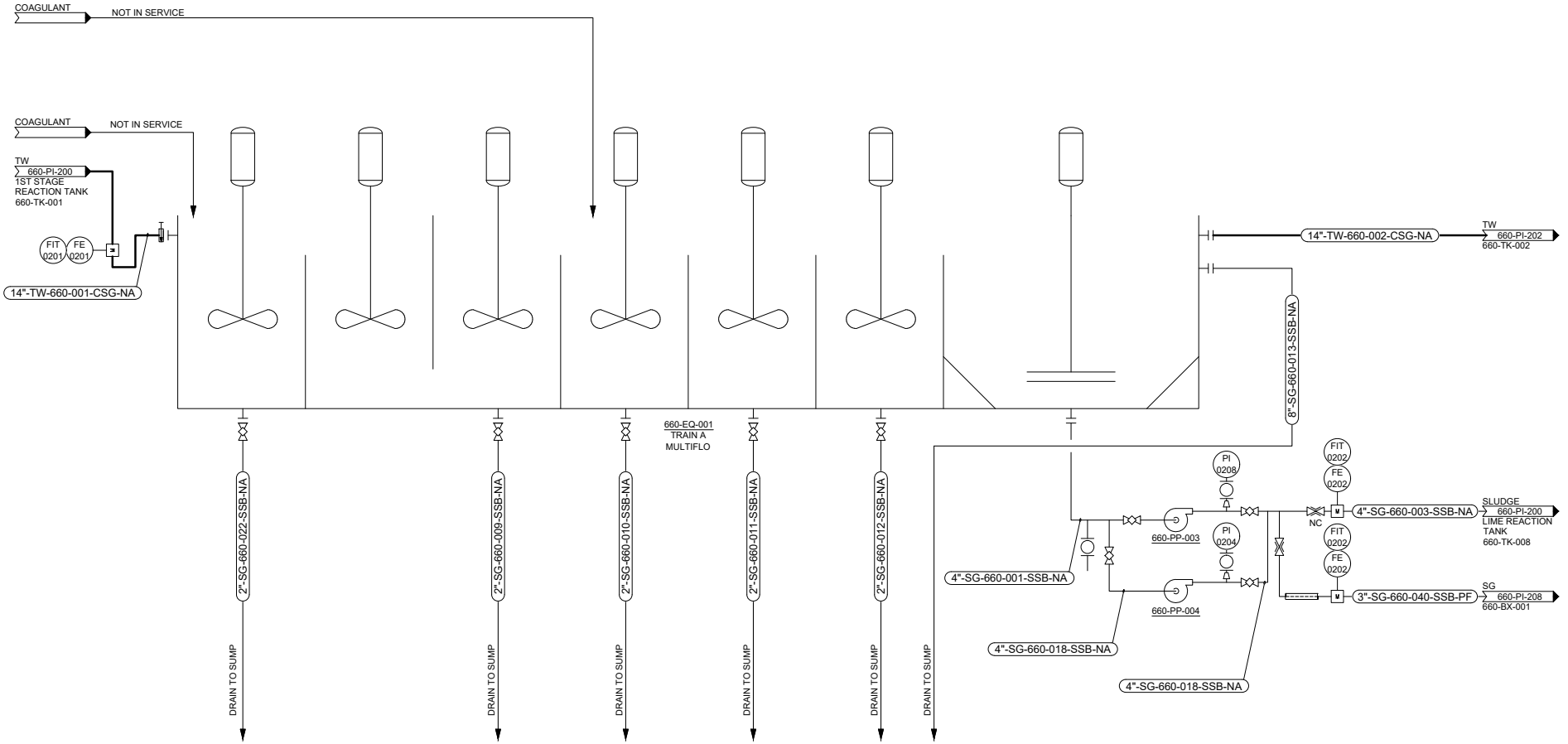
PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-200

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020



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2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

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STAGE 1 MULTIFLOW CLARIFIER

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-201

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

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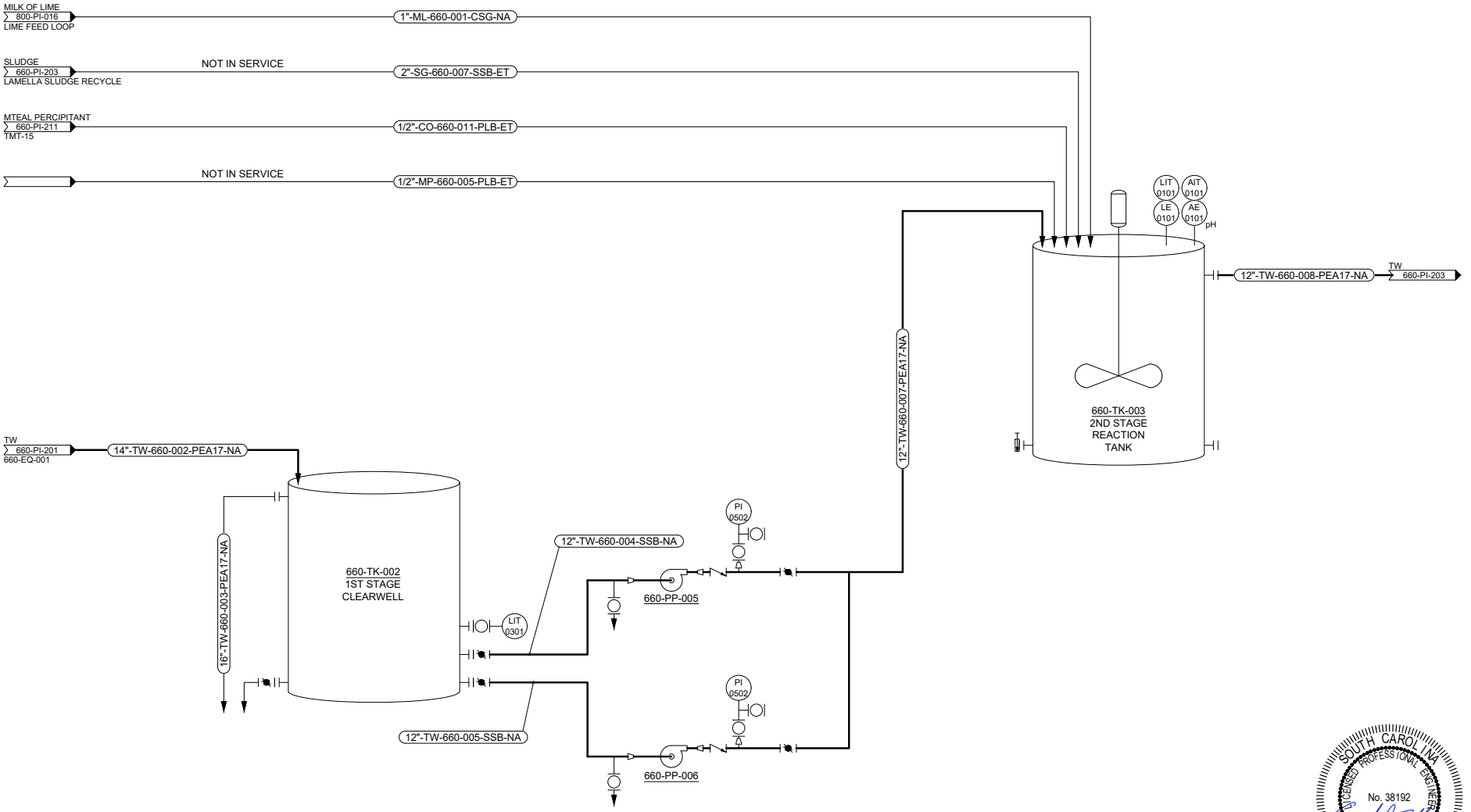

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

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2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
STAGE 1 CLEARWELL
STAGE 2 REACTION TANK

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

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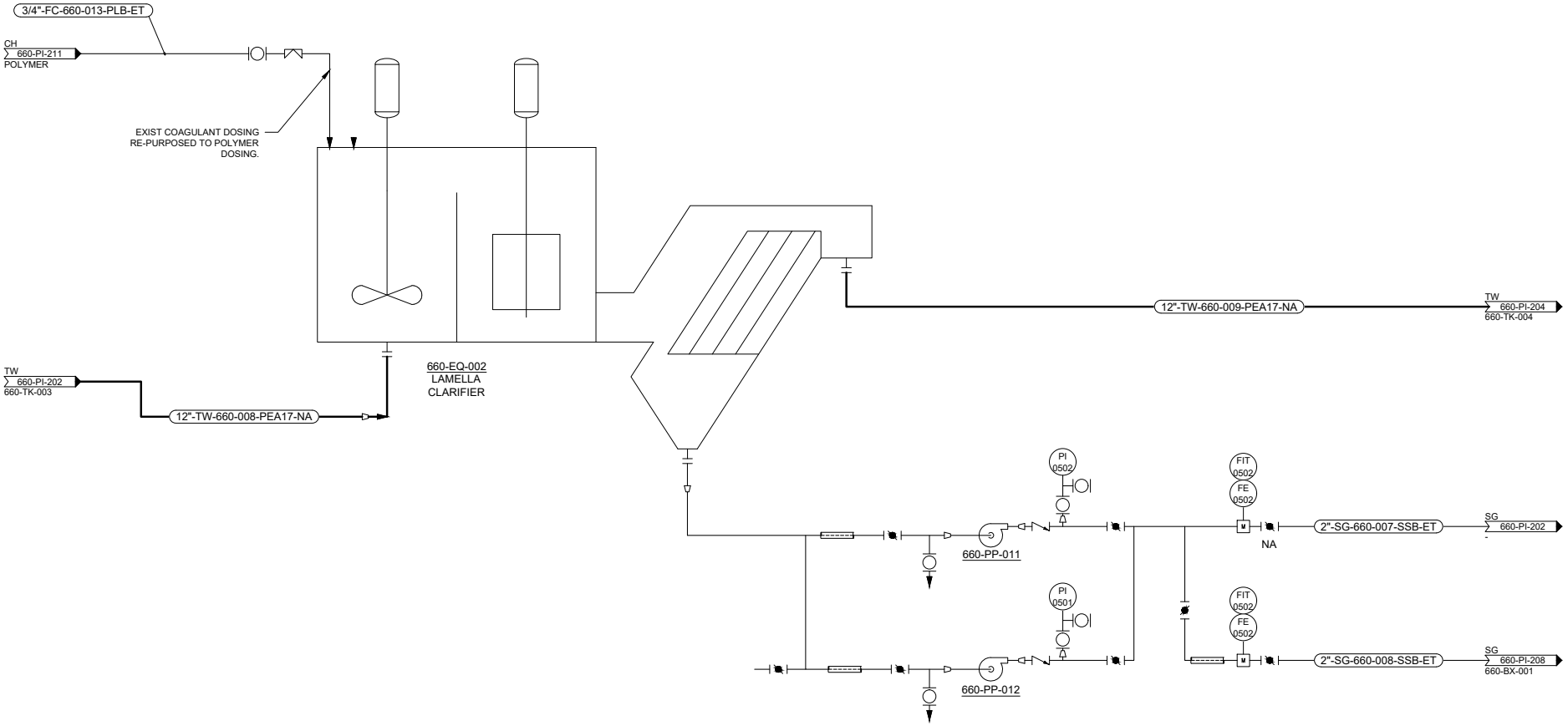

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
LAMELLA CLARIFIER
LAMELLA TRANSFER PUMPS

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO.
69.05

DATE:
AUGUST 05, 2020

SCALE:
NTS

SHEET NO.
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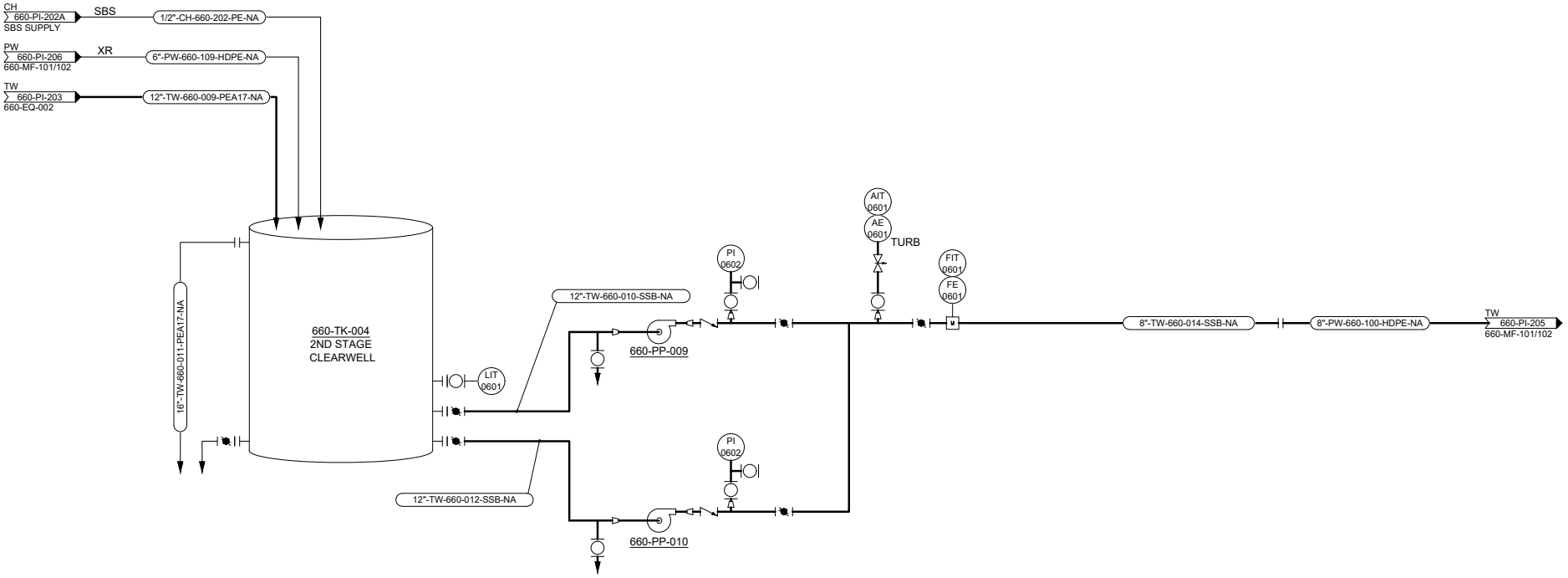


Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
2ND STAGE CLEARWELL TANK
AND TRANSFER PUMPS

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

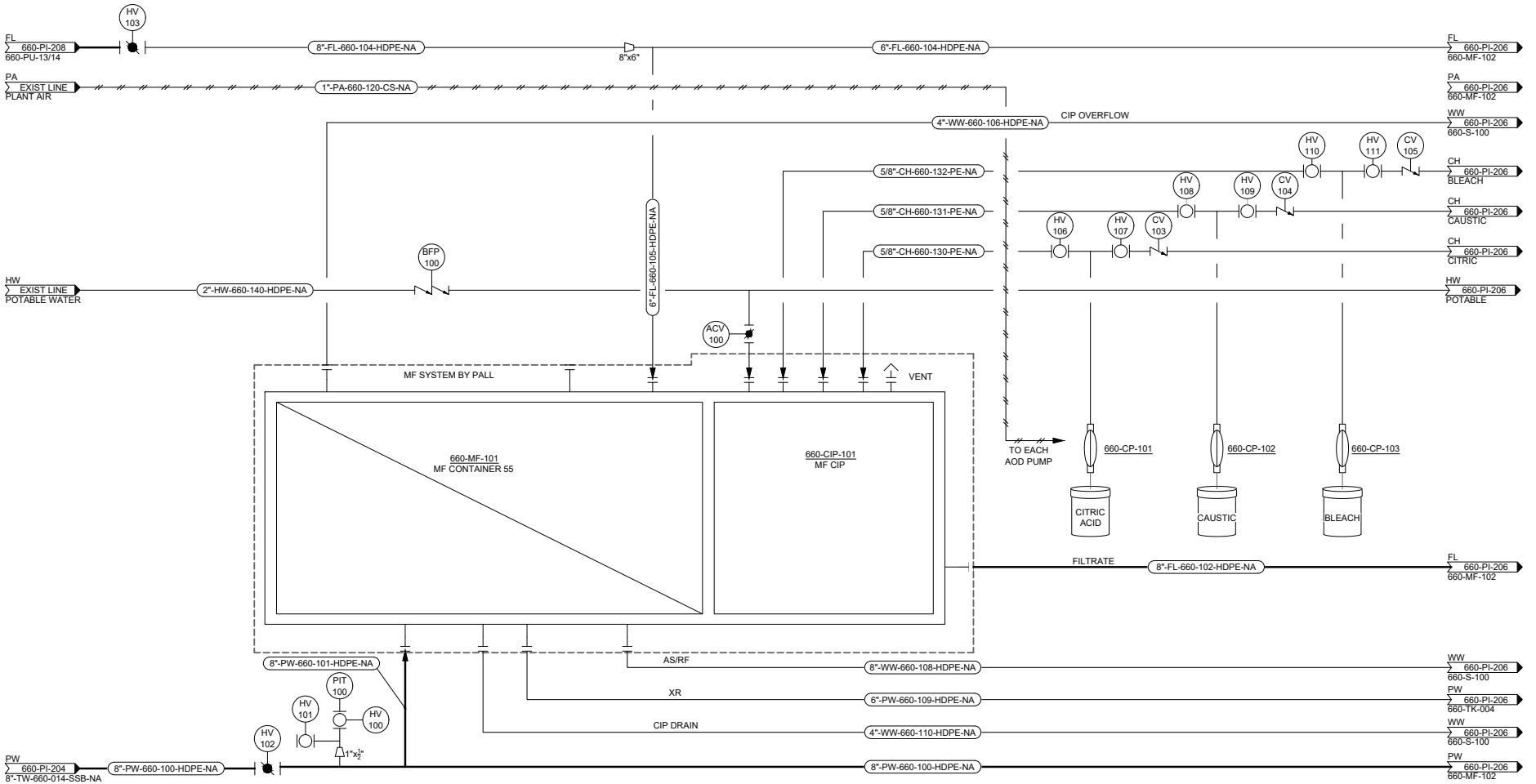
PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NA

SHEET NO. 660-PI-204

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020



SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-3003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
MICROFILTRATION 660-MF-101

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05
DATE: AUGUST 05, 2020
SCALE: NA
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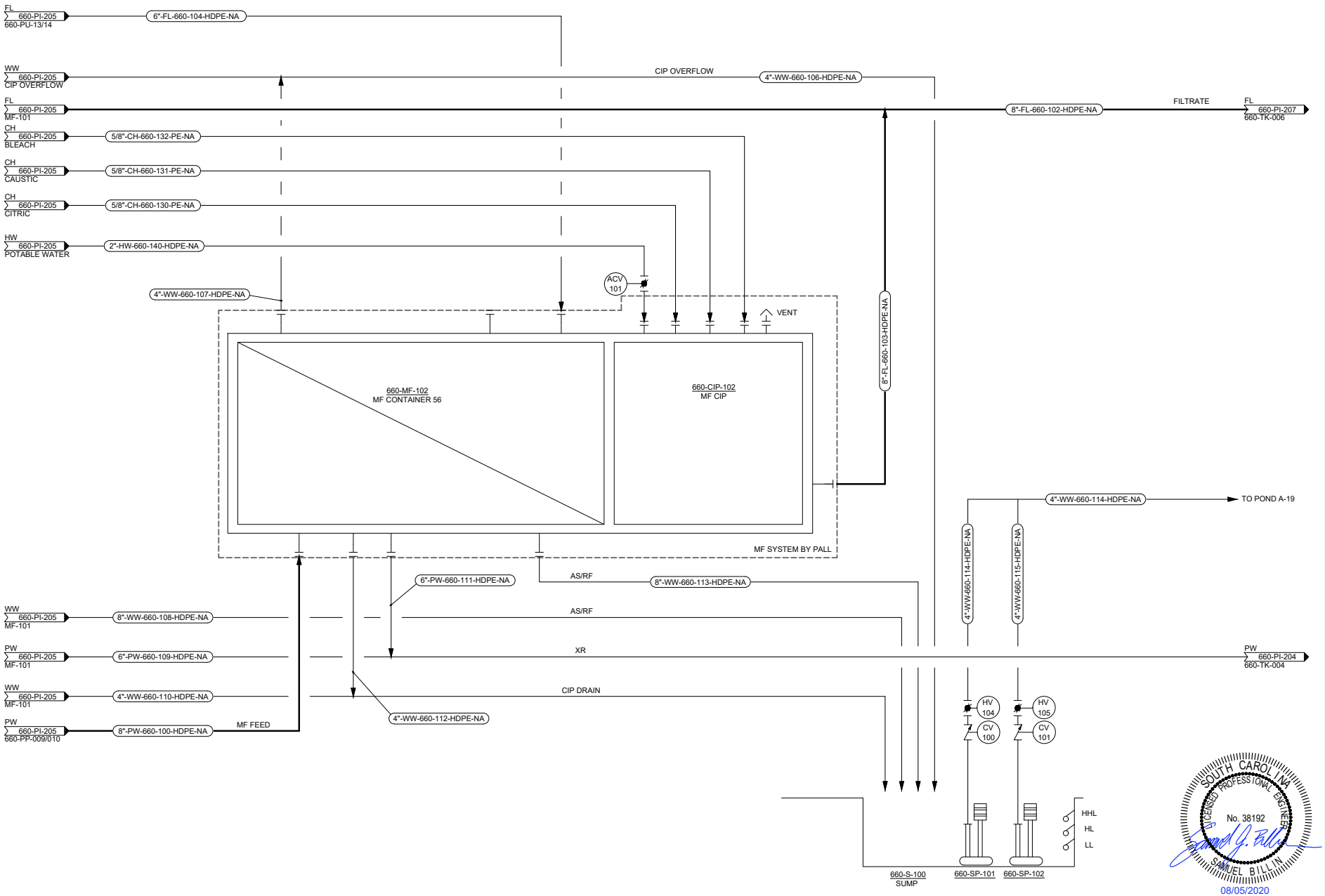

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
MICROFILTRATION 660-MF-102

PROJECT: HAILE GOLD PROJECT
WTP MODIFICATION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NA

SHEET NO. 660-PI-206

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

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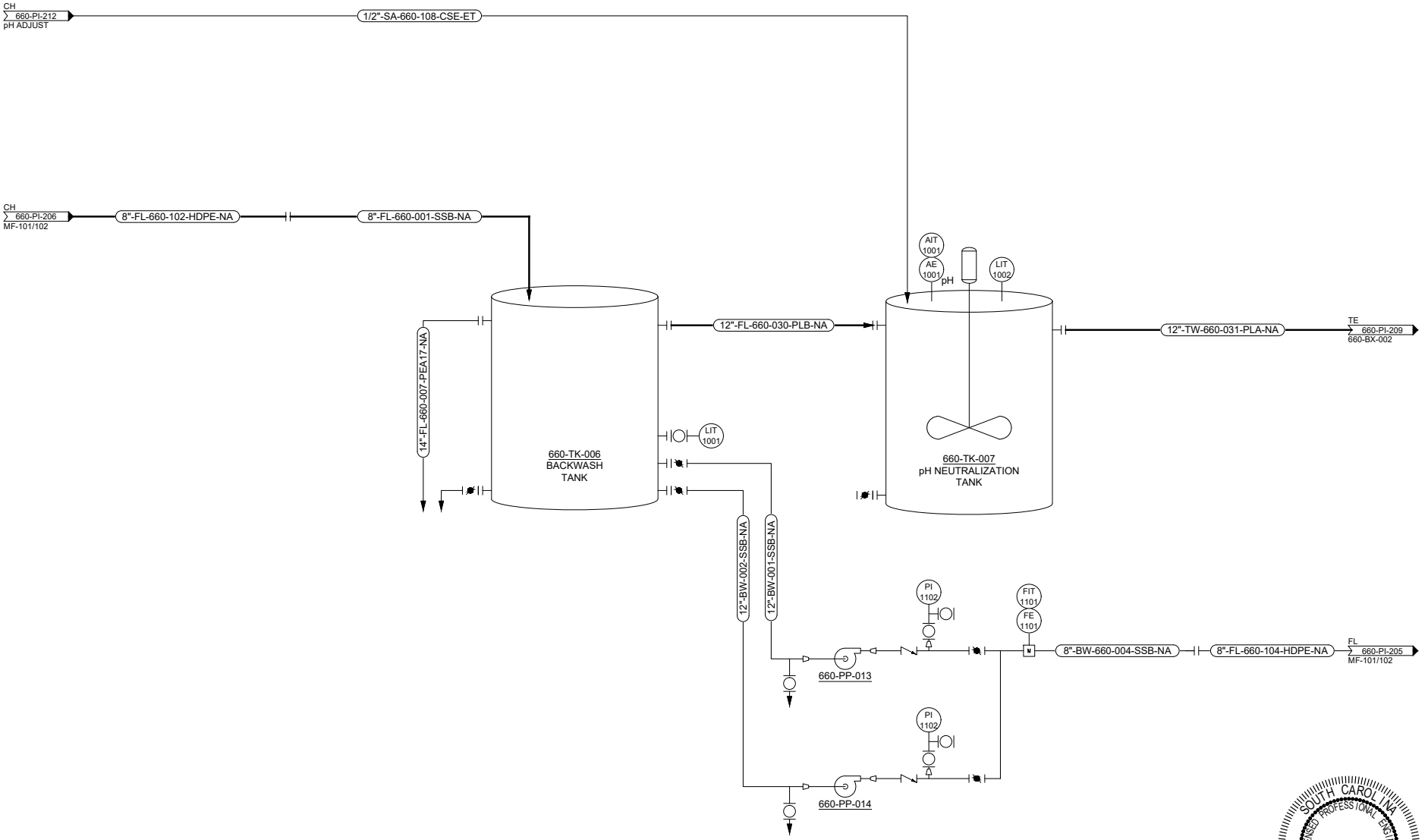

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
BACKWASH TANK & ADJUST TANK

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-207

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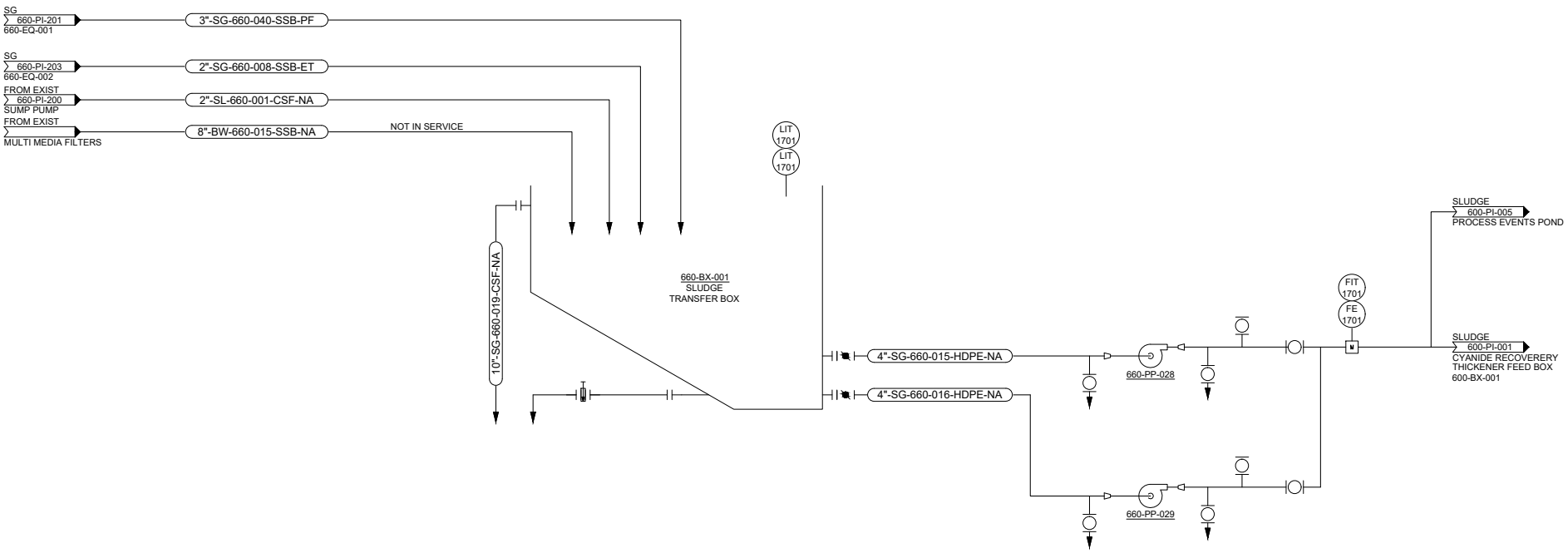

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
SLUDGE TRANSFER PUMP BOX

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-208

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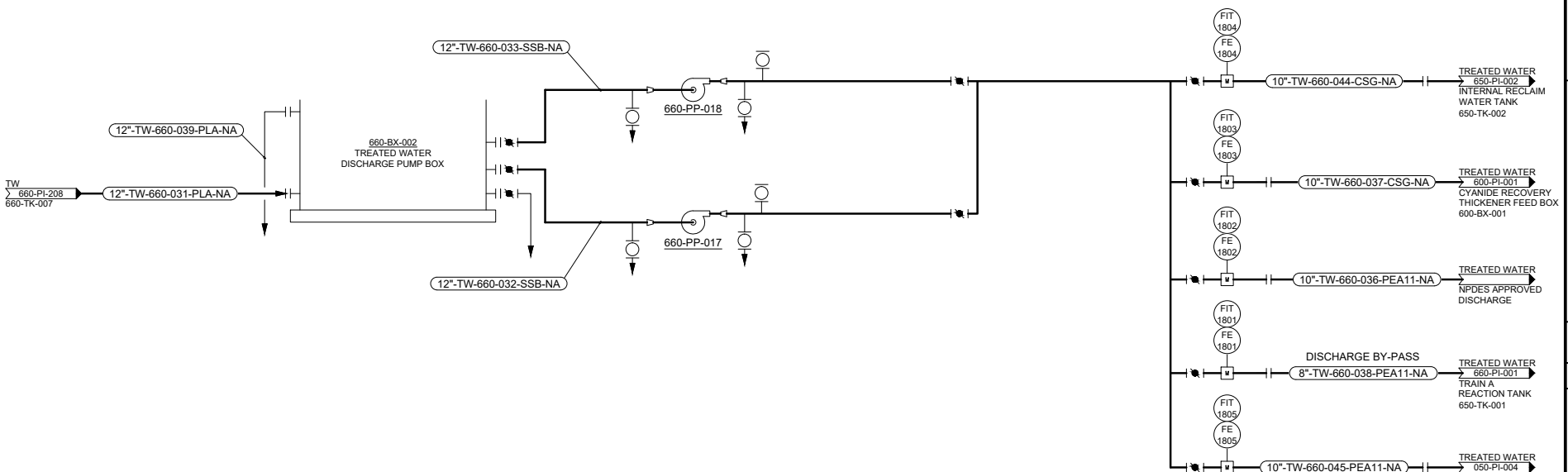


Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
TREATED WATER DISCHARGE PUMP BOX

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

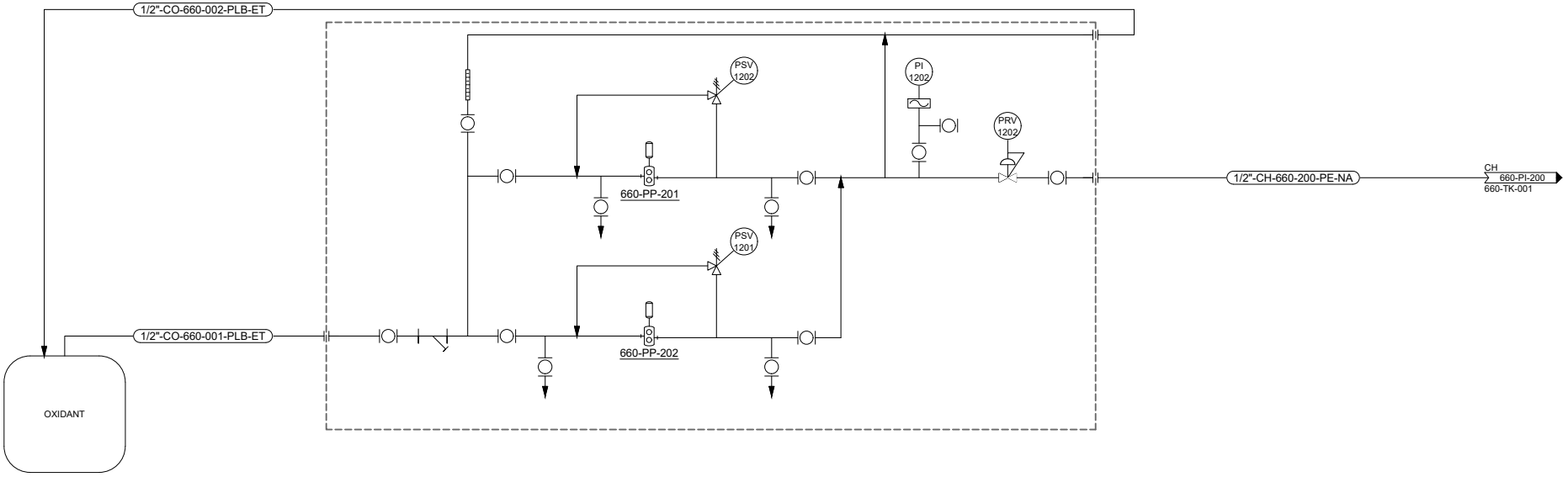
PROJECT NO. 69.05

DATE: AUGUST 05, 2020

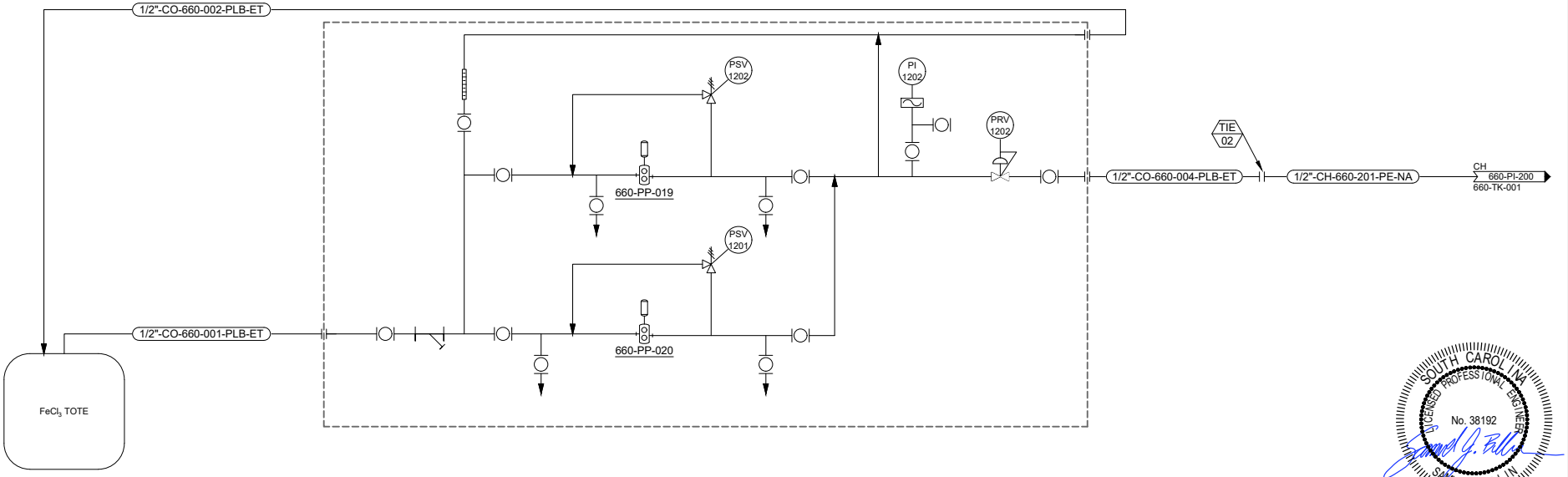
SCALE: NTS

SHEET NO. 660-PI-209

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020



OXIDANT DOSING



FERRIC CHLORIDE DOSING

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-9003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
OXIDANT DOSING
FERRIC CHLORIDE DOSING

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

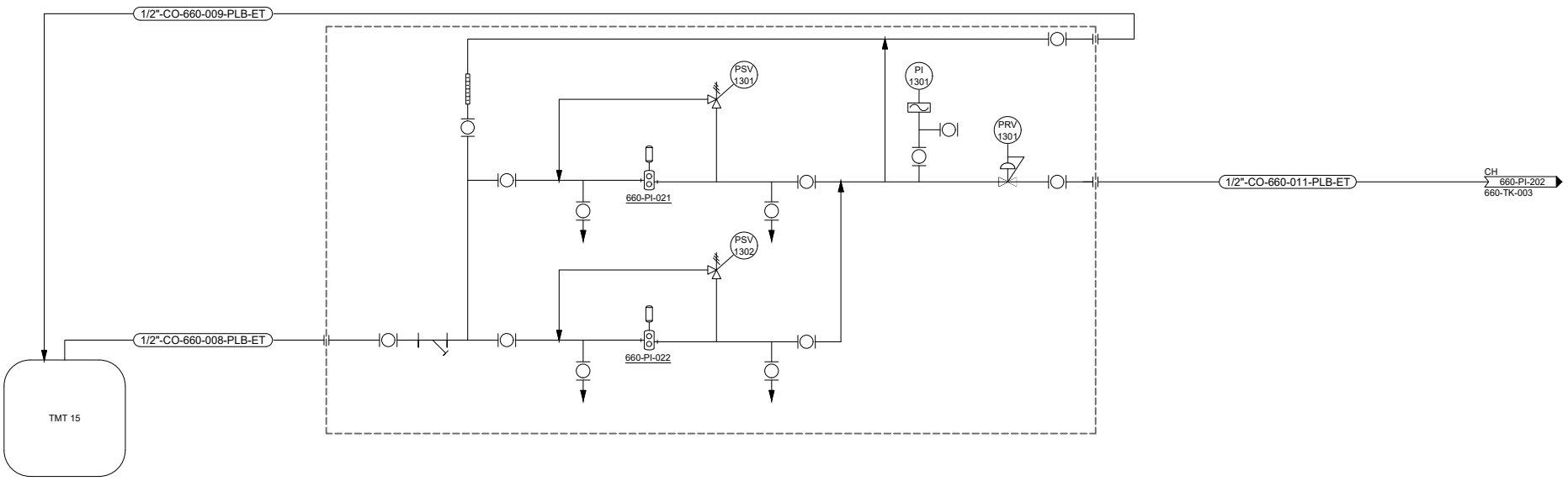
PROJECT NO. 69.05

DATE: AUGUST 05, 2020

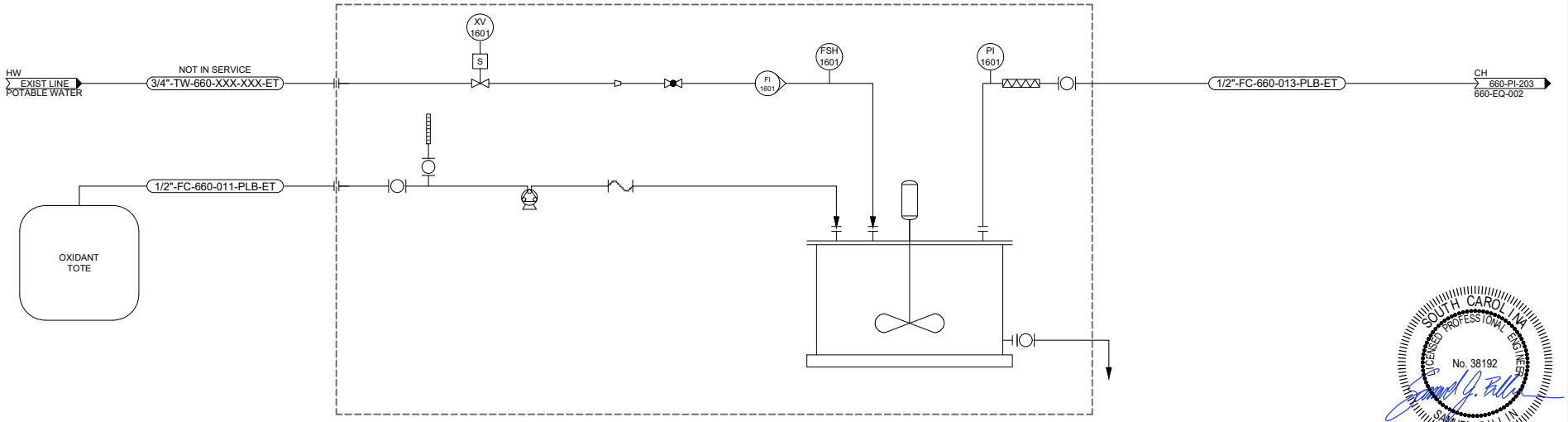
SCALE: NTS

SHEET NO. 660-PI-210

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020



TMT 15 DOSING



POLYMER DOSING

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-3003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
TMT 15 DOSING
POLYMER DOSING

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-211

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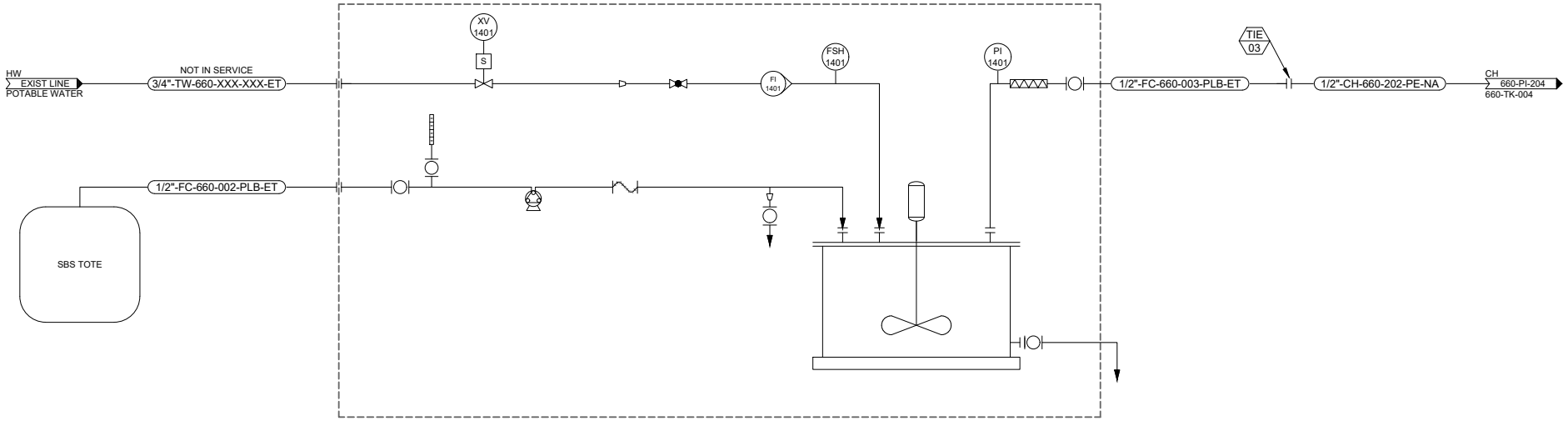
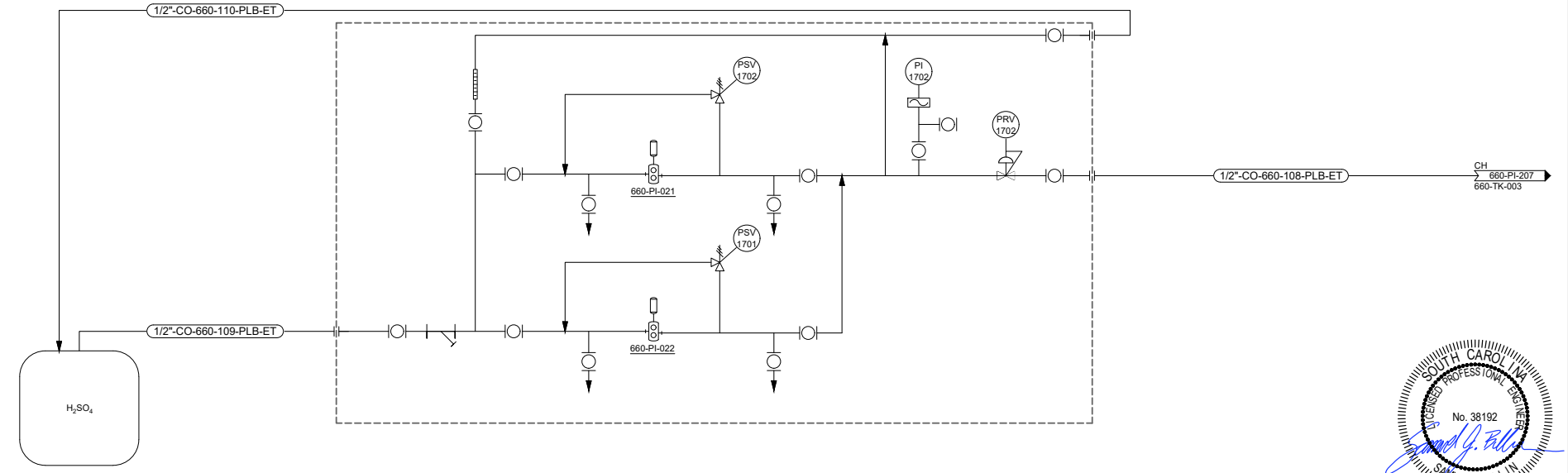


SBS DOSING



SULFURIC ACID DOSING

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 38192
SAMUEL BILLIN
08/05/2020

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-3003

REV.	DATE	REVISION DESCRIPTION
0	08/05/20	ISSUED FOR CONSTRUCTION

TITLE: PHASE 0 1200 GPM WATER TREATMENT P&ID
SBS DOSING
SULFURIC ACID DOSING

PROJECT: HAILE GOLD PROJECT
WTP EXPANSION

PROJECT NO. 69.05

DATE: AUGUST 05, 2020

SCALE: NTS

SHEET NO. 660-PI-212

APPENDIX B

SDS SHEETS

Material Safety Data Sheet

Spirit Drilling & Completion Fluids

Lime

I. PRODUCT AND COMPANY IDENTIFICATION

Chemical Name: CALCIUM HYDROXIDE CAS#: 01305-62-0
Chemical Family: BASE
Chemical Formula: Ca(OH)2
Synonyms: CALCIUM HYDRATE, SLAKED LIME

NFPA Properties: **Health: 1 Flammability: 1 Reactivity: 0 Contact: 2**

Supplier:

Spirit Drilling & Completion Fluids
4310 N. Sam Houston Parkway E
Houston, TX 77032
Office: (713) 482-0500
Fax: (713) 482-0695
Company website: www.nov.com

Emergency Telephone Number:
CHEMTREC: 1-800-424-9300 or International +1-703-527-3887

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

			TLV's (ACGIH)			
OTHER Hazardous Components	TWAPPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CAS#	LIMITS %
1. CALCIUM HYDROXIDE					1305-62-0	90-100
2.						
3.						

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point °F: N/A
Specific Gravity: 2.24
Vapor Pressure: N/A
Percent Volatility: N/A
Vapor Density: 2.5
Evaporation Rate: N/A
Solubility In Water: NEGLIBLE, LESS THAN 1 %
Melting Point °F: N/A

Color: WHITE TO OFF-WHITE
Odor: NONE
Appearance: POWDER OR CRYSTALS
pH:
Viscosity: N/A
Activity: N/A
LC50: NDA
LD50: 7340

Lime — Material Safety Data Sheet

IV. FIRE & EXPLOSION HAZARD DATA

Extinguishing Agents: DRYCHEMICAL OR WATERSPRAY OR WATERFOG OR CO2 OR FOAM OR SAND & EARTH
Flash Point °F: N/A
Flammable Limits: N/A **LEL:** N/A **UEL:** N/A
Special Firefighting Procedures: USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE
Unusual Fire & Explosion Hazards: NONE

N/A = Not Applicable NDA = No Data Available

V. HEALTH HAZARD DATA

Routes of Entry: Inhalation: YES Skin: YES Ingestion: YES
Effects of Overexposure: DUST MAY IRRITATE NOSE AND THROAT. CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
Toxicological Properties: NDA
Chronic & Acute Effects of Overexposure:
Carcinogenicity: NTP: NO IARC Monographs: NO OSHA Regulated: NO

Emergency First Aid Procedures
Eyes: IMMEDIATELY FLUSH WITH LARGE QUANTITIES OF WATER FOR AT LEAST 15 MINUTES AND CALL A PHYSICIAN.
Skin Contact: FLUSH WITH LARGE AMOUNTS OF WATER FOR 15 MINUTES.
Inhalation: REMOVE TO FRESH AIR, IF BREATHING IS DIFFICULT, GIVE OXYGEN AND CALL A PHYSICIAN.
Ingestion: CALL A PHYSICIAN.

VI. REACTIVITY DATA

Stability: STABLE Hazardous Polymerization: WILL NOT OCCUR
Hazardous Decomposition Products: AS WITH ANY ORGANIC MATERIAL, COMBUSTION WILL PRODUCE CARBON DIOXIDE (CO2) AND PROBABLY CARBON MONOXIDE (CO). OXIDES OF NITROGEN
Conditions to Avoid:
Incompatibility and Materials to Avoid: STRONG ACIDS

N/A = Not Applicable NDA = No Data Available

VII. SPILL & DISPOSAL PROCEDURES

Steps To Be Taken In Case Material is Released or Spilled --- Procedures For Clean – Up: WEAR SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL ARE WITH WATER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions To Be Taken In Handling & Storage: STORE BETWEEN 40°F AND 120°F.

Lime — Material Safety Data Sheet

VIII. PROTECTIVE EQUIPMENT

Ventilation Type Required: MECHANICAL
Protective Gloves: RUBBER OR PLASTIC (RECOMMENDED)
Respiratory Protection: USE NIOSH/OSHA APPROVED RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IF VAPOR
CONCENTRATION EXCEEDS PERMISSIBLE EXPOSURE LIMIT.
Eye/Skin Protection: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM,
Other Protective Equipment: NEOPRENE TYPE APRON
Comments:

IX. REGULATORY & TRANSPORTATION INFORMATION

US DOT Proper Shipping Name: "OIL – WELL TREATING COMPOUND"
US DOT Hazard Class: NON-HAZARDOUS DOT ID Number:
ID Number: Freight Classification:
Unregulated By DOT: Regulated by DOT: NO
Special Transportation Note:
Labels Required: NO

For further information contact:

Spirit Drilling & Completion Fluids

4310 N. Sam Houston Parkway E
Houston, Texas 77032
Office: (713) 482-0500
Fax: (713) 482-0695
Company website: www.nov.com

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

	USA	CANADA
Supplier:	Kemira Water Solutions, Inc. 316 Bartow Municipal Airport Bartow, Florida 33830	Kemira Water Solutions, Inc. of Canada 3405 Blvd. Marie Victorin Varennes, Québec J3X 1T6
Customer Service Telephones:	(800) 879-6353 (785) 842-7424	(800) 465-6171 (450) 652-0665

(800) 450-7352 - Polymers

Emergency Contacts (24 hr.)

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL

CHEMTREC	(800) 424-9300	USA (TOLL FREE)
CANUTEC	(613) 996-6666	CANADA (CALL COLLECT)

Product Name:	Ferric Chloride
Chemical Family:	Inorganic Salts
Formula:	$FeCl_3$
Synonym:	Iron (III) Chloride
Acceptable Product Uses:	Water and wastewater treatment, odor removal, adhesive for dye, textile impression pigment, ink and photoengraving.

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS Number #	Concentration	ACGIH TWA
Ferric Chloride	7705-08-0	28 – 43 %	1 mg/m3 (as Fe)
Hydrochloric Acid	7647-01-0	<5 %	5 ppm

3. HAZARDS IDENTIFICATION

Emergency Overview: Eye contact may cause irritation. Harmful if inhaled. Harmful or fatal if swallowed.

Potential Effects on Health: Acute and chronic.

Carcinogenicity: Does not contain any known carcinogens or potential carcinogens.

4. FIRST AID MEASURES

General: If you feel unwell, seek medical attention (show the label or this MSDS if possible). Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed. Ensure that medical personnel are

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

aware of the material(s) involved, and take precautions to protect themselves.

Skin Contact: Remove all contaminated clothing, jewellery, and shoes. Wash affected area with soap or mild detergent and running water for at least 15 minutes. If irritation is still present, seek medical attention.

Eye Contact: Flush immediately with water for at least 15 minutes, occasionally lifting upper and lower lids, until no evidence of chemical remains. Obtain medical attention immediately.

Inhalation: Move to fresh air. Give artificial respiration ONLY if breathing has stopped. Do not use mouth-to-mouth method if victim has 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. Obtain medical attention immediately.

Ingestion: *If conscious*, give two (2) glasses of water. DO NOT INDUCE VOMITING. Do not give anything by mouth to an unconscious person. Obtain immediate medical attention.

5. FIRE FIGHTING MEASURES

Flash point	Not applicable. Will not burn
Flammable Limits (Lower)	Not applicable
Flammable Limits (Upper)	Not applicable
Auto Ignition Temperature	Not applicable
Combustion and Thermal Decomposition Products	hydrogen chloride gas, phosgene gas if dried and then heated
Rate of Burning	Does not burn
Explosive Power	Not applicable
Sensitivity to Static Discharge	Not available

Fire and Explosion Hazards: During a fire, irritating/toxic hydrogen chloride, and/or phosgene gases may be generated if material is dried and then heated to decomposition.
Extinguishing Media: The substance is not combustible. Use extinguishing media appropriate to the surrounding fire.
NOTE: Also see "Section 10 – Stability and Reactivity"

6. ACCIDENTAL RELEASE MEASURES

Spills, Leaks, or Release:

- → Restrict access until clean-up operations are complete. Wear appropriate Personal Protective Equipment per Section 8. Ensure trained personnel conduct clean up and wear Personal Protective Equipment per Section 8.
- → Stop leak if possible. Avoid personal risk.
- → Notify Authorities if release exceeds reportable quantity per Section 15

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

- → Small Spills – Absorb spill with clay or dry material or neutralize with lime, limestone or soda ash and collect in appropriate container for disposal. Neutralization with soda ash can generate carbon dioxide so additional ventilation may be necessary.
- → Large Spills – Prevent entry into sewers and confined areas. Dike, if possible. Keep unnecessary people away, isolate area and deny entry. Pump liquid material into appropriate vessels as possible or absorb spill with clay absorbents or non-reactive dry materials and collect in appropriate container for disposal.

  Neutralize spill residuals carefully with lime, limestone, or soda ash and collect in suitable container for disposal. Flush area with water. This could generate carbon dioxide so additional ventilation may be necessary. Notify the appropriate environmental authorities.

7. HANDLING AND STORAGE

Handling: Handle all chemicals with respect. Review the label, this MSDS and any other applicable information before use. Keep separated from incompatible substances. Use appropriate Personal Protective Equipment per Section 8. Handle only with equipment, materials and supplies specified by their manufacturer as being compatible and appropriate for use with this product.

Storage Requirements:

Bulk storage containers and ancillary fill and feed systems should be constructed out of appropriate materials such as polyethylene, polypropylene, rubber-lined steel and FRP designated as appropriate for use with this product. Storage tanks should be vented to scrubber or exterior atmosphere. Storage facilities should have secondary containment as required by law or regulation. Storage tanks, piping and offloading points should be labeled with appropriate signage to avoid accidents.

Some concentrations of this product will freeze or crystallize at low temperatures. Insulate and heat-trace storage tanks, pumps, pipes and ancillary equipment as necessary.

Product should be used within one (1) year.

Material may be stored in tightly closed shipping containers, preferably the supplier containers. Containers of this material may be hazardous when empty, since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Preventive Measures:

Engineering Controls: A ventilation system of local/general exhaust is recommended to keep employee exposure below the Airborne Exposure Limits. Ensure that eyewash station and safety showers are proximal to the workstation location.

Personal Protection Equipment:

Eye Protection: Wear splash resistant chemical goggles and, where splashing is possible, a full face shield. Maintain eye wash fountain and quick-drench facilities in work area.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to avoid skin contact.

Recommended Protective Material: Neoprene

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

Respiratory Protection: Under conditions of misting or contact with head gases, respiratory protection may be needed. Consider respirator warning properties before use.

- With limited contact use an appropriate chemical cartridge respirator with acid gas cartridge(s)

- When cleaning, decontaminating or performing maintenance on tanks, containers, piping systems and accessories, and in any other situations where airborne contaminants and/or dust could be generated, use protective equipment to protect against ingestion or inhalation. HEPA or air supplied respirator, full protective coveralls with head cover, gloves and boots or chemical suits, and boots are suggested.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Reddish Brown
Odor:	Slight pungent odor
Form:	Liquid
pH as is:	<2
Vapor Pressure (mm Hg):	Negligible
Boiling Point:	105 °C - 110 °C (220 - 230 °F)
Specific Gravity (20°C):	1.26 – 1.48
Solubility (water):	max 0.78 kg $FeCl_3$ (anhydrous) / kg water
Vapor Density (Air=1):	N/A
Percent Volatile by Vol.:	N/A
Freezing Point:	Concentration dependent (Consult your Kemiron representative)

10. STABILITY AND REACTIVITY

Hazardous Decomposition Products: Thermal decomposition of dried residues - will produce hydrogen chloride gas.
Chemical Stability: Stable at normal temperatures and pressure.
Conditions to Avoid: Dangerous gases may accumulate in confined spaces.
Incompatibility with other Substances: Reacts with most metals (except Titanium and Tantalum) and bases (alkaline materials). Material has moderate oxidizing capability, avoid contact with strong reducing agents.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Based on Ferric Chloride Solid (anhydrous)
TOXICOLOGICAL DATA: LD_{50} (oral, rat) = 450 mg/kg

Mutagenicity: Other mutation test systems: Escherichia coli – 500 nmol/tube;
Phage inhibition capacity: Escherichia coli 41 ng/well

Reproductive Effects: TDLo Rat 1 day(s) intratesticular 12976 µg/kg;
TDLo Rat 1 day(s) intravaginal 29 mg/kg pre pregnancy continuous

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

Teratogenicity and Fetotoxicity: Not available

Synergistic Materials: Not available

12. ECOLOGICAL INFORMATION

Based on Ferric Chloride Solution

Ecotoxicological Information: TLm Daphnia 15 ppm/96 hr fresh water / Conditions of bioassay not specified

Persistence and Degradation: No data available

13. DISPOSAL CONSIDERATIONS

Review Federal, State, Provincial, and Local government regulations prior to disposal. This material exhibits the characteristic of corrosivity to metals and other building materials and any disposal must comply with hazardous waste disposal requirements. Any residues and/or rinse waters from cleaning of tanks, containers, piping systems and accessories may be a hazardous characteristic waste and must be properly disposed of in accordance with federal, state, provincial and local laws.
RCRA: Test waste material for corrosivity, D002, prior to disposal

14. TRANSPORT INFORMATION

	Canada (TDG)	U.S. (DOT)
Shipping Name	Ferric Chloride Solution	Ferric Chloride Solution
Hazard Class/Division	8: Corrosive liquid	8: Corrosive liquid
Identification No. Packing Group:	UN2582 III	UN2582 III

IATA/ICAO Class: 8

15. REGULATORY INFORMATION

USA CLASSIFICATION:

OSHA Classification: Hazardous by definition of Hazard Communication Standard (29 CFR 1920.1200)

CERCLA: Hazardous substance/reportable quantity (RQ): final RQ = 1000 lb. (454 kg)
Based on Anhydrous Ferric Chloride (divide by solution concentration to obtain solution weight)

SARA Regulations sections 313 and 40 CFR 372: No

SARA Hazard Categories, SARA SECTIONS 311/312 (40CRF370.21):

Acute	Yes
Chronic	No
Fire	No
Reactive	No
Sudden Release	No

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MATERIAL SAFETY DATA SHEET
Ferric Chloride

OSHA Process Safety (29CFR1910.119)	Yes

Clean Water Act Requirements: Designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance.
TSCA: This substance or all ingredients of this product are listed on the Chemical Substances Inventory of the TSCA. Does not require reporting.

Other Regulations/Legislation which apply to this product:
California Proposition 65: No

Right-To-Know Lists: Massachusetts, New Jersey, Pennsylvania, California
This product does not contain, nor is it manufactured with, ozone-depleting substances.

CANADIAN CLASSIFICATION

This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and this MSDS (Material Safety Data Sheet) contains all information required by the CPR.

Controlled Products Regulation (WHMIS) Classification: E: Corrosive

CEPA / Canadian Domestic Substances List (DSL): The substance in this product is not on the Canadian Domestic Substances List (CEPA DSL).

EEC CLASSIFICATION

EINECS: 231-729-4

16. OTHER INFORMATION

National Fire Protection Association (NFPA) and Hazardous Materials Identification System (HMIS) Ratings:

	NFPA	HMIS
HEALTH	2	2
FIRE	0	0
REACTIVITY	1	1

4 = Extreme/Severe
3 = High/Serious
2 = Moderate
1 = Slight
0 = Minimum

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MSDS Revised on October 1, 2006 by Kemira Water Solutions HSE group

SAFETY DATA SHEET

According to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: **HYPERFLOC™ AF 304**

Type of product: Mixture.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Processing aid for industrial applications.

Uses advised against: None.

1.3. Details of the supplier of the safety data sheet

Company:
SNF Inc.
1 Chemical Plant Road
Riceboro, GA 31323
United States

Telephone: 912-884-3366

Telefax: 912-884-8770

E-mail address: info@snfhc.com

1.4. Emergency telephone number

24-hour emergency number: 800-424-9300 CHEMTREC (CCN 20412), Outside U.S. 703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to paragraph (d) of 29 CFR 1910.1200:

Not classified.

2.2. Label elements

Labelling according to paragraph (f) of 29 CFR 1910.1200:

Hazard symbol(s):	None.
Signal word:	None.
Hazard statement(s):	None.
Precautionary statement(s):	None.

2.3. Other hazards

Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 3: Composition/information on ingredients

3.1. Substances
Not applicable, this product is a mixture.

3.2. Mixtures
This product is a mixture.

Hazardous components
Contains no reportable hazardous substances.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
Move to fresh air. No hazards which require special first aid measures.

Skin contact:
Wash off with soap and plenty of water. Get medical attention if irritation develops and persists.

Eye contact:
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of persistent eye irritation, consult a physician.

Ingestion:
Rinse mouth with water. Do NOT induce vomiting. No hazards which require special first aid measures.

4.2. Most important symptoms and effects, both acute and delayed

None.

4.3. Indication of any immediate medical attention and special treatment needed

None reasonably foreseeable.

Other information:
None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.
Warning! Aqueous solutions or powders that become wet render surfaces extremely slippery.

Unsuitable extinguishing media:
None.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products:
Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

5.3. Advice for firefighters

Protective measures:
In the event of fire, wear self-contained breathing apparatus.

Other information:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

Protective equipment:
Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Emergency procedures:
Keep people away from spill/leak. Prevent further leakage or spillage if safe to do so.

6.2. Environmental precautions

As with all chemical products, do not flush into surface water.

6.3. Methods and material for containment and cleaning up

Small spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Large spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Residues:
After cleaning, flush away traces with water.

6.4. Reference to other sections

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations;

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Aqueous solutions or powders that become wet render surfaces extremely slippery. Use personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

Keep in a dry place. Keep container closed when not in use.
Incompatible with oxidizing agents.

7.3. Specific end use(s)

This information is not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:
None known.

8.2. Exposure controls

Appropriate engineering controls:

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Individual protection measures, such as personal protective equipment:

a) Eye/face protection:
Safety glasses with side-shields.

b) Skin protection:
i) Hand protection: PVC or other plastic material gloves.
ii) Other: Workclothes protecting arms, legs and body.

c) Respiratory protection:
No personal respiratory protective equipment normally required. Dust safety masks recommended where working powder concentration is more than 10 mg/m³.

d) Additional advice:
Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls:

Do not allow uncontrolled discharge of product into the environment. Do not flush into surface water.

SECTION 9: Physical and chemical properties

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

a) Appearance:	Granular solid, White.
b) Odour:	None.
c) Odour Threshold:	Not applicable.
d) pH:	5 - 9 @ 5 g/L
e) Melting point/freezing point:	> 150°C
f) Initial boiling point and boiling range:	Not applicable.
g) Flash point:	Not applicable.
h) Evaporation rate:	Not applicable.
i) Flammability (solid, gas):	No data available.
j) Upper/lower flammability or explosive limits:	Not expected to create explosive atmospheres.
k) Vapour pressure:	Not applicable.
l) Vapour density:	Not applicable.
m) Relative density:	0.6 - 0.9
n) Solubility(ies):	Soluble in water.
o) Partition coefficient:	-2
p) Autoignition temperature:	Does not self-ignite (based on the chemical structure).
q) Decomposition temperature:	> 150°C
r) Viscosity:	See Technical Bulletin.
s) Explosive properties:	Kst = 0 Non-flammable to ignition sources of less than 2.5 kJ.
t) Oxidizing properties:	Not expected to be oxidising based on the chemical structure.

9.2. Other information

None.

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Oxidizing agents may cause exothermic reactions.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

Incompatible with oxidizing agents.

10.6. Hazardous decomposition products

Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx), hydrogen cyanide (hydrocyanic acid).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Information on the product as supplied:

Acute oral toxicity:	LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 5000 mg/kg.
Acute inhalation toxicity:	The product is not expected to be toxic by inhalation.
Skin corrosion/irritation:	Not irritating.
Serious eye damage/eye irritation:	Not irritating.
Respiratory/skin sensitisation:	Not sensitizing.
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic.
Reproductive toxicity:	Not toxic for reproduction.
STOT - Single exposure:	No known effects.
STOT - Repeated exposure:	No known effect.
Aspiration hazard:	No hazards resulting from the material as supplied.

SECTION 12: Ecological information

12.1. Toxicity

Information on the product as supplied:

Acute toxicity to fish:	LC50/Danio rerio/96 hours > 100 mg/L (OECD 203) LC50/Fathead minnow/96 hours > 100 mg/L (OECD 203)
Acute toxicity to invertebrates:	EC50/Daphnia magna/48 hours > 100 mg/L (OECD 202)
Acute toxicity to algae:	IC50/Scenedesmus subspicatus/72 hours > 100 mg/L (OECD 201)
Chronic toxicity to fish:	No data available.
Chronic toxicity to invertebrates:	No data available.
Toxicity to microorganisms:	No data available.
Effects on terrestrial organisms:	No known effects.
Sediment toxicity:	No data available.

12.2. Persistence and degradability

Information on the product as supplied:

Degradation:	Not readily biodegradable.
Hydrolysis:	Does not hydrolyse.
Photolysis:	No data available.

12.3. Bioaccumulative potential

Information on the product as supplied:

Not bioaccumulating.

Partition co-efficient (Log Pow):	-2
Bioconcentration factor (BCF):	~0

12.4. Mobility in soil

Information on the product as supplied:

None.

12.5. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste from residues/unused products:

Dispose in accordance with local and national regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Contaminated packaging:

Rinse empty containers with water and use the rinse-water to prepare the working solution. If recycling is not practicable, dispose of in compliance with local regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Recycling:

In accordance with local and national regulations.

SECTION 14: Transport information

Land transport (DOT)

Not classified.

Sea transport (IMDG)

Not classified.

Air transport (IATA)

Not classified.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Information on the product as supplied:

TSCA Chemical Substances Inventory:

All components of this product are either listed on the inventory or are exempt from listing.

US SARA Reporting Requirements:

SARA (Section 311/312) hazard class:
Not concerned.

SARA Title III Sections:

Section 302 (TPQ) - Reportable Quantity:
Not concerned.

Section 304 - Reportable Quantity:
Not concerned.

Section 313 (De minimis concentration):
Not concerned.

Clean Water Act

Section 311 Hazardous Substances (40 CFR 117.3) - Reportable Quantity:
Not concerned.

Clean Air Act

Section 112(r) Accidental release prevention requirements (40 CFR 68) - Reportable Quantity:
Not concerned.

CERCLA

Hazardous Substances List (40 CFR 302.4) - Reportable Quantity:
Not concerned.

RCRA status :

Not RCRA hazardous.

California Proposition 65 Information:

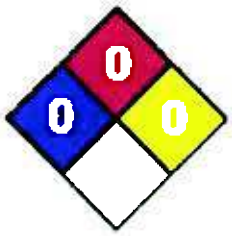
WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide

SECTION 16: Other information

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0



HMIS:

Health:	0
Flammability:	0
Physical Hazard:	0
PPE Code:	B

This data sheet contains changes from the previous version in section(s):

SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Acronyms
STOT = Specific target organ toxicity

Training advice:

Do not handle until all safety precautions have been read and understood.

This SDS was prepared in accordance with the following:

U.S. Code of Federal Regulations 29 CFR 1910.1200

Version: 19.01.a

PRAC001

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Sierra Chemical Co.

Material Safety Data Sheet

This MSDS has been prepared within the guidelines of the Federal OSHA Hazard Communication Standard, 29CFR 1910.1200.

Product Name: Sierra Sani Chlor / Sierra Pure Chlor / Sierra Bleach / Sierra Sanitizer

I. GENERAL INFORMATION

Manufacturer: Sierra Chemical Co.
Address: 2302 Larkin Cr.
Sparks, NV 89431
Date: 12-20-06 **Supersedes:** 9-23-05

Emergency Phone: (800) 424-9300
Information Phone: (775) 358-0888
CHEMTREC Phone: (800) 424-9300

II. PRODUCT IDENTIFICATION

Proper Shipping Name: Hypochlorite Solution
Synonyms/Common Names: Liquid Bleach, Liquid Chlorine
CAS Number: 7681-52-9

Chemical Formula: NaOCl
Chemical Family: Acid Salts, Oxidizers

III. PHYSICAL DATA

Appearance and Odor: Light greenish-yellow liquid, chlorine-like odor.

Boiling Point: Decomposes on heating
Water Solubility: Miscible
pH @ 25°C: 11.5 (approximately)

Vapor Pressure @ 25° C: No data
Specific Gravity: 1.08 - 1.26
Molecular Weight: 75.45 (NaOCl Active ingredient)

IV. INGREDIENTS/IDENTITY INFORMATION

Component	CAS No.	OSHA PEL/TLV	%
Sodium Hypochlorite	7681-52-9	Not Established	5-15
Sodium Chloride	7647-14-5		5-11
Sodium Hydroxide	1310-73-2	2 mg/m^3	.5-2.0
Water	7732-18-5		Balance

V. FIRE AND EXPLOSION DATA

Flash Point: N/A **Auto-ignition Temperature:** N/A **LEL:** N/A **UEL:** N/A

Extinguishing Media: Use any media appropriate for surrounding fire. Use water to cool containers exposed to fire.

Special Fire Fighting Procedures: Wear NIOSH approved self-contained breathing apparatus (SCBA) and protective clothing to prevent direct contact with the material (to include, but not limited to; boots, gloves, hard hat and impervious clothing).

Unusual Fire and Explosion Hazards: None

VI. STABILITY/REACTIVITY DATA

Stability: Unstable ☐ Stable ☒

Hazardous Polymerization: May Occur ☐ Will Not Occur ☒

Conditions to Avoid: High temperatures, sunlight and ultraviolet light. Decomposition will result from contact with iron and copper. Do not store at temperatures above 60-70o F (15-21o C). This product has a shelf life of up to 6 months at 60o F or lower.

Incompatibility: This product is incompatible with iron, copper, acids, ammonium compounds, organics and other oxidizers. It will react violently with phenyl acetonitrile, cellulose and ethylene.

Hazardous Decomposition or Byproducts: Produces toxic chlorine gas upon contact with acids.

VII. TOXICOLOGICAL INFORMATION/HEALTH HAZARD DATA

This product is harmful if inhaled or ingested and is harmful if contacted by the skin or eyes. The reported threshold for odor is approximately 0.9 mg/m^3 based on the odor of chlorine. Symptoms which may be aggravated by exposure are asthma, respiratory and cardiovascular disease.

Eye Contact: Contact with eyes will cause irritation. It may also cause burns to the eyes or impairment of vision and corneal damage.

Skin Contact: Contact with skin can cause burns and/or irritation. Symptoms of contact are redness, swelling and scab formation of contacted area. If prolong exposure occurs, it can cause damage to the secondary tissue resulting in the inability of regeneration to the affected area.

Inhalation: Sodium Hypochlorite when inhaled is irritating to the nose, mouth, throat, and lungs. Burns to the respiratory tract may occur with production of lung edema which could result in shortness of breath, wheezing, choking, chest pain, and impairment of lung function. High concentrations can result in permanent lung damage. Repeated exposure can cause impairment of lung function and permanent lung damage.

Ingestion: Irritation and/or burns can occur to the entire gastro-intestinal tract. Symptoms are characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding, and/or tissue ulceration.

Exposure Limit Information: There is no established PEL for sodium hypochlorite. The Federal OSHA Permissible Exposure Limit (PEL) for sodium hydroxide is 2 mg/m^3.

VIII. EMERGENCY AND FIRST AID

If a known exposure occurs or if poisoning is suspected, do not wait for symptoms to develop. Immediately initiate the recommended procedures below. Simultaneously contact a Poison Control Center, a physician or the nearest hospital. Inform the person contacted of the type and extent of exposure, describe the victim's symptoms and follow the advice given. For additional information call, **CHEMTREC (800) 424-9300.**

Eye Contact: Immediately flush the eyes with large quantities of running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. Do not attempt to neutralize with chemical agents. Obtain medical attention as soon as possible. Oils or ointments should not be used. Continue the flushing for an additional 15 minutes if the physician is not immediately available.

Skin Contact: Immediately remove contaminated clothing and shoes under a safety shower. Flush all affected areas with large amount of water for at least 15 minutes. Do NOT attempt to neutralize with chemical agents. Obtain medical attention as soon as possible.

Inhalation: Nausea, headaches and dizziness are signs that a person should stop working and be taken to fresh air immediately until symptoms are gone. Should breathing become difficult, give oxygen. Keep the person warm, resting and contact a physician. A person could inhale enough vapors to lose consciousness. This person should be moved to fresh air. Call a physician immediately. If breathing stops, artificial respiration should be given immediately. In all cases, ensure adequate ventilation and provide respiratory protection before returning to work.

Ingestion: Do NOT induce vomiting. Immediately give large quantities of water. If vomiting does occur, give fluids again. Do not induce vomiting or give anything by mouth to an unconscious person. Call a physician or the nearest Poison Control Center immediately.

IX. PROTECTIVE EQUIPMENT REQUIREMENTS

Ventilation Requirements: Local exhaust ventilation if vapors, mists, or aerosols are present. If these are not present use general exhaust ventilation.

Respiratory Requirements: Due to low volatility and toxicity, a respirator is not normally needed. However, if vapors, mists, or aerosols are generated, wear a NIOSH/MSHA approved respirator.

Additional Protective Clothing: Use chemical safety goggles and impermeable gloves. Use rubber apron to protect body from splashing conditions.

Other: Safety shower and eye-wash station recommended.

X. HANDLING AND STORAGE

Normal Handling: Store in vented, closed, clean, non-corrosive containers in a cool, dry, well ventilated location, away from direct sunlight and from chemicals which may react with the bleach if spillage occurs. If closed containers become heated, the containers should be vented to release decomposition product . **Do not** mix or contaminate with ammonia, hydrocarbon, acids, alcohols, ethers.

Do not store at temperatures above 60-70°F (15-21°). This product has a shelf life of up to six months at 60°F or lower. **DO NOT** package in metal containers.

Material Release or Spills: Always wear personal protective equipment including, but not limited to; boots gloves and impervious clothing. If hazardous concentrations are found in the local spill area, use a NIOSH/MSHA approved respirator. Vapors may be suppressed by the use of a water fog and all water runoff should be captured for treatment and disposal. Dike or contain spill by using a compatible absorbent such as sand, clay, soil or commercial absorbents.

XI. SPILL OR LEAK HANDLING

IN CASE OF AN EMERGENCY, CALL CHEMTREC (800) 424-9300

Any person responding to a spill or leak should use a NIOSH/MSHA approved respirator. Additional protective clothing must be worn to prevent direct contact with the material. This includes (but is not limited to) boots, gloves, hard hat, and impervious clothing. Compatible materials are neoprene, butyl rubber, viton, and saranex.

Hazardous concentrations may be found in the local spill area and immediately downwind. Vapors may be suppressed by the use of a water fog and all water run off should be captured for treatment and disposal. Dike or contain by using a compatible absorbent such as sand, clay, soil, commercial absorbents. Use vacuum or pump operation to remove product released and treat before disposal. Dispose of spill residues per guidelines in Section "XII Disposal" of this MSDS.

XII. ENVIRONMENTAL-REGULATORY STATUS/DISPOSAL

The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and non-hazardous wastes.

EPA Hazardous Substance Status: Reportable Quantity (RQ) = 100 lbs. NOTICE: this product contains chlorine which is listed in the Toxic Substance Control Act (TSCA) and is subject to reporting requirements of EPCRA Section 313.

RCRA Status of Unused Material if Discarded: Not a hazardous waste. As a non-hazardous waste, this material should be disposed of in accordance with Federal, State and local regulations by treatment in a wastewater treatment system.

XIII. TRANSPORTATION DATA

DOT Proper Shipping Name: Hypochlorite Solution

Hazard Class: 8 **UN I.D. Number:** UN1791 **PACKING GROUP:** III

Reportable Quantity: 100 lbs. (80 Gallons 12.5% Solution)

XIV. ADDITIONAL INFORMATION

All information is offered in good faith, without guarantee or obligation for the accuracy or sufficiency thereof, or the results obtained, and is accepted at user's risk. The uses referred to are for the purpose of illustration only. User should investigate and establish the suitability of such use(s) in every case. Nothing herein shall be constructed as a recommendation for uses which infringe valid patents or as extending license under valid patents.

SAFETY DATA SHEET

Creation Date 08-Feb-2010 **Revision Date** 03-May-2012 **Revision Number** 4

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Description: **Sodium metabisulfite**
Cat No. **419580000; 419580010; 419580025; 419580050; 419582500**
Synonyms Sodium pyrosulfite
Molecular Formula Na2 O5 S2
Reach Registration Number --

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company
Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

For information in the US, call: 001-800-ACROS-01
For information in Europe, call: +32 14 57 52 11

Emergency Number, Europe: +32 14 57 52 99
Emergency Number, US: 001-201-796-7100

CHEMTREC Phone Number, US: 001-800-424-9300
CHEMTREC Phone Number, Europe: 001-703-527-3887

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards
Based on available data, the classification criteria are not met

Health hazards
Based on available data, the classification criteria are not met

Acute oral toxicity	Category 4
Serious Eye Damage/Eye Irritation	Category 1

Environmental hazards
Based on available data, the classification criteria are not met

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Symbol(s) Xn - Harmful

SECTION 2: HAZARDS IDENTIFICATION

R-phrase(s)

R22 - Harmful if swallowed
R31 - Contact with acids liberates toxic gas
R41 - Risk of serious damage to eyes

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16

2.2. Label elements

Signal Word **Danger**

Hazard Statements

H302 - Harmful if swallowed
H318 - Causes serious eye damage
EUH031 - Contact with acids liberates toxic gas

Precautionary Statements

P280 - Wear eye protection/ face protection
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
P233 - Keep container tightly closed
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell

2.3. Other hazards

No information available.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008	DSD Classification - 67/548/EEC
Sodium metabisulfite	7681-57-4	EEC No. 231-673-0	>95	Acute Tox. 4 (H302) Eye Dam. 1 (H318) (EUH031)	Xn; R22 R31 Xi; R41

Reach Registration Number	--

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Get medical attention immediately if symptoms occur.
Protection of First-aiders	Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination

4.2. Most important symptoms and effects, both acute and delayed

No information available

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Substance is nonflammable; use agent most appropriate to extinguish surrounding fire..

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products
Sodium oxides, Sulfur oxides.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Avoid contact with skin, eyes and clothing.

6.2. Environmental precautions

Should not be released into the environment.

6.3. Methods and material for containment and cleaning up

Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Do not get in eyes, on skin, or on clothing. Keep away from acids.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store near acids.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits

Component	European Union	The United Kingdom	France	Belgium	Spain
Sodium metabisulfite		STEL: 15 mg/m^3 15 min TWA: 5 mg/m^3 8 hr	TWA / VME: 5 mg/m^3 (8 heures).	TWA: 5 mg/m^3 8 uren	TWA / VLA-ED: 5 mg/m^3 (8 horas)

Component	Italy	Germany	Portugal	The Netherlands	Finland
Sodium metabisulfite			TWA: 5 mg/m^3 8 horas		

Component	Austria	Denmark	Switzerland	Poland	Norway
Sodium metabisulfite		TWA: 5 mg/m^3 8 timer	MAK: 5 mg/m^3 8 Stunden		TWA: 5 mg/m^3 8 timer STEL: 10 mg/m^3 15 minutter.

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Sodium metabisulfite		TWA: 5 mg/m^3 8 satima.	TWA: 5 mg/m^3 8 hr.		

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Sodium metabisulfite			TWA: 5 mg/m^3		TWA: 5 mg/m^3 8 klukkustundum. Ceiling: 10 mg/m^3

Biological limit values
This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

Derived No Effect Level (DNEL) No information available.

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source.

Personal protective equipment

Eye Protection Safety glasses with side-shields (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Disposable gloves	See manufacturers recommendations	-	EN 374	(minimum requirement)

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Skin and body protection Long sleeved clothing

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators
To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly.

Large scale/emergency use In case of insufficient ventilation wear suitable respiratory equipment

Small scale/Laboratory use Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

When RPE is used a face piece Fit Test should be conducted.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice

Environmental exposure controls No information available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Off-white	
Physical State	Powder, Solid.	
Odor	rotten-egg like	
Odor Threshold	No data available	
pH	4-6	5% aq.sol.
Melting Point/Range	150°C / 302°F	
Softening Point	No data available	
Boiling Point/Range	No information available.	
Flash Point	Not applicable	**Method -** No information available.
Evaporation Rate	No information available.	
Flammability (solid,gas)	No information available.	
Explosion Limits	No data available.	

Vapor Pressure	No information available.	
Vapor Density	No information available.	(Air = 1.0)
Specific Gravity / Density	No data available1.4	
Bulk Density	No data available	
Water Solubility	540 g/L (20°C)	
Solubility in other solvents	No information available.	

Partition Coefficient (n-octanol/water)	**Component**	**log Pow**
	Sodium metabisulfite	-3.7

Autoignition Temperature	No data available
Decomposition temperature	120 °C
Viscosity	No data available
Explosive Properties	No information available.
Oxidizing Properties	No information available.

9.2. Other information

Molecular Formula	Na2 O5 S2
Molecular Weight	190.1

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available.

10.2. Chemical stability

Air sensitive. Moisture sensitive.

10.3. Possibility of hazardous reactions

Hazardous Polymerization	No information available
Hazardous Reactions	Contact with acids liberates toxic gas.

10.4. Conditions to avoid

Avoid dust formation, Incompatible products, Excess heat, Exposure to air or moisture over prolonged periods.

10.5. Incompatible materials

Acids. Strong oxidizing agents.

10.6. Hazardous decomposition products

Sodium oxides, Sulfur oxides.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;

Oral	No data available
Dermal	No data available
Inhalation	No data available

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium metabisulfite	1131 mg/kg (Rat)	2 g/kg (Rat)	

(b) skin corrosion/irritation; No data available

(c) serious eye damage/irritation; No data available

(d) respiratory or skin sensitization;

Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

Mutagenic effects have occurred in experimental animals.

(f) carcinogenicity; No data available

There are no known carcinogenic chemicals in this product

(g) reproductive toxicity; No data available
Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs Eyes, Central nervous system (CNS), Liver, Kidney.

(j) aspiration hazard; No data available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information

Symptoms / effects, both acute and delayed No information available.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects . Do not empty into drains.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Sodium metabisulfite	32 mg/L LC50 96 h	89 mg/L EC50 = 24 h	40 mg/L EC50 = 96 h 48 mg/L EC50 = 72 h	EC50 = 56 mg/L 17 h

12.2. Persistence and degradability No information available

12.3. Bioaccumulative potential No information available.

Component	log Pow	Bioconcentration factor (BCF)
Sodium metabisulfite	-3.7	No data available

12.4. Mobility in soil . .

12.5. Results of PBT and vPvB assessment No data available for assessment

12.6. Other adverse effects

Endocrine Disruptor Information This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant This product does not contain any known or suspected substance
Ozone Depletion Potential This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.
Contaminated Packaging	Empty remaining contents. Dispose of in accordance with local regulations. Do not re-use empty containers.
European Waste Catalogue (EWC)	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific
Other Information	Waste codes should be assigned by the user based on the application for which the product was used

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO Not regulated

14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group

ADR Not regulated

14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group

IATA Not regulated

14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group

14.5. Environmental hazards No hazards identified

14.6. Special precautions for user No special precautions required

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories X = listed

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	CHINA	AICS	KECL
Sodium metabisulfite	231-673-0	-		X	X	-	X	X	X	X	X

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Sodium metabisulfite	WGK 1	

Component	France - INRS (Tables of occupational diseases)
Sodium metabisulfite	Tableaux des maladies professionnelles (TMP) - RG 66

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment
Take note of Dir 94/33/EC on the protection of young people at work

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R22 - Harmful if swallowed
R31 - Contact with acids liberates toxic gas
R41 - Risk of serious damage to eyes

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Existing and Evaluated Chemical Substances

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Industrial Hygiene
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic

TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
PNEC - Predicted No Effect Concentration
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor

ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet,
Chemadvisor - LOLI,
Merck index,
RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Creation Date	08-Feb-2010
Revision Date	03-May-2012
Revision Summary	
Reason for revision	(M)SDS sections updated, 3.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product information

Trade name	:	TMT 15®
Use of the Substance / Preparation	:	For industrial use
Function		Precipitant
Company	:	Evonik Degussa Corporation USA 299 Jefferson Road Parsippany,NJ 07054-0677 USA
Telephone	:	973-929-8000
Telefax	:	973-929-8040
US: CHEMTREC EMERGENCY NUMBER	:	800-424-9300
CANADA: CANUTEC EMERGENCY NUMBER	:	613-996-6666
Product Regulatory Services	:	973-929-8060

2. HAZARDS IDENTIFICATION

***** EMERGENCY OVERVIEW *****

***Form**-liquid* ***Color**-colourless to yellowish* **Odor**-*almost odourless*

Irritating to eyes.

Eye contact
irritating

Skin Contact
Slightly irritating.

Inhalation
No hazard expected in normal use.

Ingestion
No hazard expected in normal use.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature

Aqueous preparation
Content min. 15 %

The preparation contains:

Information on ingredients / Hazardous components

1,3,5-triazine-2,4,6(1H,3H,5H)-trithione, trisodium salt
CAS-No. 17766-26-6 Percent (Wt./ Wt.) 15 %

Other information

This material is classified as hazardous under OSHA regulations.

4. FIRST AID MEASURES

General advice

Pay attention to self-protection.
Remove victims from hazardous area. Immediately remove soiled or soaked clothing and remove it to a safe distance. Keep victim warm, in a stabilized position and covered.
Do not leave victims unattended.
If the casualty is unconscious: Place the victim in the recovery position.

Inhalation

Potential for exposure by inhalation if aerosols or mists are generated.
Move victims into fresh air.
With labored breathing: Provide with oxygen. Consult a doctor.
If the casualty is not breathing: Perform mouth-to-mouth resuscitation, notify emergency physician immediately.

Skin contact

Wash off affected area immediately with plenty of water for at least 15 minutes.
If symptoms persist, consult a physician for treatment.

Eye contact

With eye held open, thoroughly rinse immediately with plenty of water for at least 10 minutes.
Consult an ophthalmologist immediately if the symptoms persist.

Ingestion

Rinse out mouth.
Immediately give large quantities of water to drink.
Consult a physician immediately.

Notes to physician

The initial focus is only on the local action, possibly characterized by a progressive tissue irritation.
In the eye, irritating liquids cause, depending on the intensity of exposure, irritation of the conjunctiva and, in exceptional cases, damage to the cornea.
There is a danger of blindness if corneas are damaged!
Superficial irritations and only infrequent damage with ulcerations develop on the skin.
An irritation of the mucous membranes may develop and lead to coughing after inhalation.

5. FIRE-FIGHTING MEASURES

Flash point	does not flash
Lower explosion limit	No data available
Upper explosion limit	No data available
Autoignition temperature	not applicable

Suitable extinguishing media
water, mist, quenching powder, foam

Extinguishing media which must not be used for safety reasons
None known

Specific hazards during fire fighting
In the case of fire, the following hazardous smoke fumes may be produced: nitric oxides, sulphur oxides.

Special protective equipment for fire-fighters
As in any fire, wear self-contained positive-pressure breathing apparatus, (MSHA/NIOSH approved or equivalent) and full protective gear.

Further information
Standard procedure for chemical fires.
Ensure there are sufficient retaining facilities for water used to extinguish fire. Water used to extinguish fire should not enter drainage systems, soil or stretches of water. Contaminated fire-extinguishing water must be disposed of in accordance with the regulations issued by the appropriate local authorities. Fire residues should be disposed of in accordance with the regulations.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear personal protective equipment; see section 8.

Environmental precautions
Observe regulations on prevention of water pollution (collect, dam up, cover up).
Do not allow the product into the following compartments:
surface water
stretches of water

Obey relevant local, state, provincial and federal laws and regulations. Do not contaminate any lakes, streams, rivers, groundwater or soil.

Methods for cleaning up
Absorb with liquid-binding material (e.g. inert absorbent or universal binder).
Dispose of absorbed material in accordance with the regulations.
see section 13.
Rinse away any residue with plenty of water.

Additional advice

Isolate and seal off defective containers immediately.

7. HANDLING AND STORAGE

Handling

Safe handling advice

Handle in accordance with good industrial hygiene and safety practices.

Avoid contact with skin and eyes.

Wear personal protective equipment.
For personal protection see section 8.
Immediately change moistened and saturated work clothes.

No eating, drinking, smoking, or snuffing tobacco at work.

Wash hands before breaks and at the end of workday.
preventive skin protection

Advice on protection against fire and explosion

The product is not combustible.

Storage

Requirements for storage areas and containers

clean, dry.
Use shatterproof containers.
Protect from frost.
Transport and store container in upright position only.
Always close container tightly after removal of product.

Further information

Use by date of the product: min. 2 years.
Use alkaliresistant materials.

Advice on common storage

Store away from: oxidizing agents, acids.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Remarks No substance-specific limiting value being known.

Component occupational exposure guidelines

Engineering measures

No dangerous reactions are known to occur with correct handling and storage.

Personal protective equipment

Respiratory protection

A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 or applicable federal/provincial requirements must be followed whenever workplace conditions warrant respirator use. NIOSH's "Respirator Decision Logic" may be useful in determining the suitability of various types of respirators.

Hand protection

Applies to handling for brief periods or of small amounts

Glove material	Nitrile, for example, Dermatril P 743, Kächele-Cama Latex GmbH (KCL), Germany
Material thickness	0.20 mm
Break through time	> 480 min
Method	DIN EN 374

Applies to handling for longer periods or of large amounts

Glove material	Chloroprene, for example: Camapren 720, Kächele-Cama Latex GmbH (KCL), Germany
Material thickness	0.65 mm
Break through time	> 480 min
Method	DIN EN 374

The above mentioned hand protection is based on knowledge of the chemistry and anticipated uses of this product but it may not be appropriate for all workplaces. A hazard assessment should be conducted prior to use to ensure suitability of gloves for specific work environments and processes prior to use.

Eye protection

wear basket-shaped glasses or safety goggles with side-shields.

Skin and body protection

A safety shower and eye wash fountain should be readily available.
To identify additional Personal Protective Equipment (PPE) requirements, it is recommended that a hazard assessment in accordance with the OSHA PPE Standard (29CFR1910.132) be conducted before using this product.

Hygiene measures

No eating, drinking, smoking, or snuffing tobacco at work.
Wash face and/or hands before break and end of work.
Avoid contaminating clothes with product.
Immediately change moistened and saturated work clothes.

Protective measures

Avoid contact with skin and eyes.
Handle in accordance with good industrial hygiene and safety practices.
Wear suitable protective clothing, gloves and eye/face protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Color	colourless to yellowish
Odor	almost odourless

Safety data

pH	ca. 12.3 (22.5 °C)
Melting point/range	-3 °C
Boiling point/range	101 °C
Flash point	does not flash
Flammability	not applicable
Autoignition temperature:	not applicable
Autoinflammability	not spontaneously flammable
Explosiveness	not applicable
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapor pressure	22 mbar (20 °C)
Density	ca. 1.12 g/cm3 (20 °C)
Relative density	No data available
Water solubility	No data available
Partition coefficient (n-octanol/water)	log Pow: < -2 Method: (calculated)
Viscosity, dynamic	1.6 mPa.s (20 °C)
conductivity	ca. 60 mS/cm (22 °C)
Molecular Weight	243.22 g/Mol

Further information

Miscibility in water	completely miscible

10. STABILITY AND REACTIVITY

Conditions to avoid	frost.
Materials to avoid	strong oxidant, acids.
Hazardous decomposition products	None known

Thermal decomposition	> 370 °C solid No decomposition if stored and applied as directed.
Hazardous reactions	No dangerous reactions are known to occur with correct handling and storage. product is stable.

11. TOXICOLOGICAL INFORMATION

Product Acute oral toxicity	LD50 Rat: 7878 mg/kg Method: analogy OECD-method related to substance: TMT (15%)
Product Acute inhalation toxicity	No data available
Product Acute dermal toxicity	LD50 Rat: > 2000 mg/kg Method: OECD Test Guideline 402 related to substance: TMT (55%) LD50 Rat: 7333 mg/kg (calculated based on TMT 55%) related to substance: TMT (15%)
Product Skin irritation	Rabbit / 4 h slightly irritating Method: OECD Test Guideline 404 related to substance: TMT (55%)
Product Eye irritation	Rabbit irritant Method: OECD Test Guideline 405 related to substance: TMT (55%)
Product Sensitization	maximization test guinea pig: not sensitizing Method: OECD Test Guideline 406 related to substance: TMT (55%)
Product Repeated dose toxicity	Oral Rat Testing period: 30 d NOAEL: 526 mg/kg target organ/effect: Erythrocytes Method: OECD Test Guideline 407 related to substance: TMT (55%) Oral Rat Testing period: 30 d NOAEL: 1929 mg/kg target organ/effect: Erythrocytes (calculated based on TMT 55%) related to substance: TMT (15%)

Product Gentoxicity in vitro	Ames test S. typhimurium / E. coli negative Method: analogy OECD-method related to substance: TMT (15%)
Product Gentoxicity in vivo	Micronucleus test mouse Oral negative Method: OECD TG 474 related to substance: TMT (15%)
Product Carcinogenicity	No data available
Product Toxicity to reproduction	No data available
Product Human experience	To date handling this product has not been known to cause any detrimental effects.

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

Biodegradability

aerobic
inoculum: Activated sludge
Not readily biodegradable.
0 %
Exposure time: 28 d
Method: OECD TG 302 B
related to substance: TMT (15%)

anaerobic
inoculum: Activated sludge
Not readily biodegradable.
0 %
Exposure time: 60 d
Method: CO2 Evolution Test
related to substance: TMT (15%)

Ecotoxicity effects

Toxicity to fish

LC0 static test Leuciscus idus melanotus: 1000 mg/l / 96 h
Analytical monitoring: no
Method: DIN 38412 Teil 15
related to substance: TMT (acid form)

LC0 static test Leuciscus idus melanotus: 9147 mg/l / 96 h
(calculated based on acid form)
related to substance: TMT (15%)

LC0 static test Leuciscus idus melanotus: 1500 mg/l / 48 h
Analytical monitoring: no
Method: DIN 38412 Teil 15

related to substance: TMT (acid form)

LC0 static test Leuciscus idus melanotus: 13720 mg/l / 48 h
(calculated based on acid form)
related to substance: TMT (15%)

LC50 semi-static test Brachydanio rerio: > 560 - 1000 mg/l / 96 h
Analytical monitoring: no
Method: OECD TG 203
Noxious effect due to pH shift
pH: 8 - 11
related to substance: TMT (60%)

LC50 semi-static test Brachydanio rerio: 2240 - 4000 mg/l / 96 h
Noxious effect due to pH shift
pH: 8 - 11
(Calculated from TMT 60%).
related to substance: TMT (15%)

LC50 static test Pimephales promelas (fathead minnow): 190.1 mg/l / 96 h
Analytical monitoring: yes
Method: ASTM
related to substance: TMT (15%)

Toxicity to daphnia

EC50 Daphnia magna: 38 mg/l / 48 h
Method: OECD TG 202
related to substance: TMT (acid form)

EC50 Daphnia magna: 253 mg/l / 48 h
(calculated based on acid form)
related to substance: TMT (15%)

Toxicity to algae

IC 50 scenedesmus subspicatus: 273 mg/l / 72 h
End point: Biomass
Analytical monitoring: no
Method: OECD 201
related to substance: TMT (15%)

Toxicity to bacteria

EC50 Activated sludge: 1036 mg/l / 3 h
Analytical monitoring: no
Method: DEV L3 (TTC test)
related to substance: TMT (60%)

EC50 Activated sludge: 4144 mg/l / 3 h
(Calculated from TMT 60%).
related to substance: TMT (15%)

Further information on ecology

Chemical Oxygen Demand (COD) 139800 mg/l
Method: DEV H 41
related to substance: TMT (15%)

Biochemical Oxygen Demand (BOD)	0 mg/g Concentration: 16 mg/l (BOD5) Method: DEV H5/a2 (dilution method) related to substance: TMT (60%) 0 mg/g Concentration: 64 mg/l (BOD5) (Calculated from TMT 60%). related to substance: TMT (15%)
AOX	The product does not contain any organically bonded halogen.
General Ecological Information	Does not contain any heavy metals and compounds from EC directive 76/464 Is adsorbed to activated sludge

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

Advice on disposal	Waste must be disposed of in accordance with local, state, provincial and federal laws and regulations. Empty containers must be handled with care due to product residue.

14. TRANSPORT INFORMATION

Transport/further information

Not dangerous according to transport regulations.

15. REGULATORY INFORMATION

Information on ingredients / Non-hazardous components

This product contains the following non-hazardous components

Water
CAS-No. 7732-18-5 Percent (Wt./ Wt.) 85 %

US Federal Regulations

OSHA

If listed below, chemical specific standards apply to the product or components:

- None listed

Clean Air Act Section (112)

If listed below, components present at or above the de minimus level are hazardous air pollutants:

- None listed

CERCLA Reportable Quantities

If listed below, a reportable quantity (RQ) applies to the product based on the percent of the named component:

- None listed

SARA Title III Section 311/312 Hazard Categories

The product meets the criteria only for the listed hazard classes:

- Acute Health Hazard

SARA Title III Section 313 Reportable Substances

If listed below, components are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

- None listed

Toxic Substances Control Act (TSCA)

If listed below, non-proprietary substances are subject to export notification under Section 12 (b) of TSCA:

- None listed

State Regulations

California Proposition 65

A warning under the California Drinking Water Act is required only if listed below:

- None listed

International Chemical Inventory Status

Unless otherwise noted, this product is in compliance with the inventory listing of the countries shown below. For information on listing for countries not shown, contact the Product Regulatory Services Department.

• Europe (EINECS/ELINCS)	Listed/registered
• USA (TSCA)	Listed/registered
• Canada (DSL)	Listed/registered
• Australia (AICS)	Listed/registered
• Japan (MITI)	Listed/registered
• Korea (TCCL)	Listed/registered
• Philippines (PICCS)	Listed/registered
• China	Listed/registered

16. OTHER INFORMATION

HMIS Ratings

Health :	2
Flammability :	0
Physical Hazard :	0

Further information

Data for the production of the safety data sheet from the studies available and from the literature. Further information about the characteristics of the product can be found in the product code of practice or in the Product-Brochure .

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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Limits on Effluent from Treatment System for Contact Waters: Metals & Cyanide

NPDES Permit No. SC0040479, dated July 10, 2013

Constituent	Monthly Average (µg/L)	Daily Maximum (µg/L)	Sample Frequency	Sample Type	Controlling Basis-Average	Controlling Basis-Maximum
Arsenic, total	10.0	14.6	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Cadmium, total	2.4	28.7	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Copper, total	94.9	160.8	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Lead, total	49.9	600.0	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Mercury, total	0.051	0.074	1 / week	Grab	Human Heath - Organism	Human Heath - Organism
Selenium, total	5.0	20.0	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Thallium, total	0.47	0.69	1 / week	24-hr. Composite	Human Heath-Organism	Human Heath - Organism
Zinc, total	750	1500	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Cyanide, total	140	204	1 / week	Grab	Aquatic life	Aquatic life
Cyanide, free	5.2	22.0	1 / week	Grab	Aquatic life	Aquatic life
Hydrogen Sulfide (H_2S)	2.0	4.0	1 / week	Calculation	Aquatic life	Aquatic life
pH	6.0 to 8.5	6.0 to 8.5	1 / week	Continuous	Aquatic life	Aquatic life
TSS (mg/l)	20	30	1 / week	24-hr. Composite	Aquatic life	Aquatic life
Whole Effluent Toxicity (WET)	25%	40%	1 / week	Grab	Aquatic life	Aquatic life

Assumptions:

- Average effluent flow of 1.728 MGD (1,200 gpm)
- Effluent hardness of 100 mg/L as $CaC0_3$ as a grab sample
- Average results calculated from four (4) samples/month

Construction Permit Application
Water/Wastewater Facilities

BUREAU OF WATER

DELEGATED REVIEW PROJECT SUBMITTAL: Yes ☐ EXPEDITED REVIEW PROGRAM SUBMITTAL: Yes ☐

SELECT ONE ♦ ☐ Water Facilities ☐ Wastewater Facilities ☐ Combined Water & Wastewater Facilities

I. **Project Name:** Haile Gold Mine **County:** Lancaster

II. **Project Location** (street names, etc.): 6911 Snowy Owl Road

III. **Project Description(s):** *Water System:* _____

Wastewater System: Contact Wastewater Treatment Facility

Project Type (A-Z): Water: ____ Wastewater: X *(See instructions for the appropriate project code)*

IV. ***Initial* Owner:** [Time of Application] Name/Organization: Haile Gold Mine, Inc.

Address: 6911 Snowy Owl Road City: Kershaw State: SC Zip: 29067

Phone #: (____) _____ E-mail (Initial Owner): _____

V. ***Final* Owner:** [After Construction] Name/Organization: Same

Address: _____ City: _____ State: ____ Zip: _____

Phone #: (____) _____ E-mail (Final Owner): _____

VI. **Entity Responsible for Final Operation & Maintenance of System:**

Water System: Name: _____ Address: _____

City: _____ State: ____ Zip: _____ Phone#: (____) _____ Fax#: (____) _____

Wastewater System: Name: Same Address: _____

City: _____ State: ____ Zip: _____ Phone#: (____) _____ Fax#: (____) _____

VII. **Engineering Firm:** Name: Same Address: _____

City: _____ State: ____ Zip: _____ Phone #: (____) _____ Fax #: (____) _____

E-mail (Design Engineer): _____

VIII. **Is this project:** A) Part of a phased project? No ☑ Yes ☐. If Yes, Phase _____ of _____

B) A revision to a previously permitted project? No ☐ Yes ☑. If Yes, Permit#: SC0040479

Date Approved: 12/1/2013 Project name (if different): _____

C) Submitted based on a Schedule of Compliance or Order issued by DHEC? No ☐ Yes ☐. Order #: _____

D) Anticipating funding by the State Revolving Fund (SRF)? No ☐ Yes ☐.

E) Crossing a water body (e.g., river, creek)? No ☐ Yes ☐. If Yes, Name of waterbody: _____

IX. **Are Standard Specifications approved by DHEC being used on this project?** No ☑ Yes ☐. If Yes:

Water: Date Approved: _____ Approved for whom: _____

Wastewater: Date Approved: _____ Approved for whom: _____

X. **Wastewater Systems:** A) Type: Domestic ☐ Process (Industrial) ☑ Combined (Domestic & Process) ☐

B) *Average Design Flow* 1. Project: 1728000 GPD 2. Treatment system: 1728000 GPD

C) *Sewers or Pretreatment* 1. Name of facility (e.g., POTW) treating the wastewater: _____

2. NPDES/ND Number of facility in Item #1: _____

Treatment Systems 3. Date Preliminary Engineering Report (PER) approved: _____

4. NPDES/ND application submitted? No ☐ Yes ☐. If Yes, Date: _____

Disposal Sites 5. Effluent Disposal Site (Description): Haile Gold Mine

6. Sludge Disposal Site (Description): Haile Gold Mine

XI. **Water Systems:** Project located within city limits? No ☑ Yes ☐.
Public water system providing water. Name: _____ System #.: _____
New water system (including master meter)? No ☐ Yes ☐. If Yes, System name: _____

XII. **Type of Submittal:** Complete **Section A (Standard)** *or* **Section B (Delegated Review Program - DRP).**

A) Standard Submittal *must* include the following:

☑ 1. A transmittal letter outlining the submittal package.
☐ 2. The **original** construction permit application, properly completed, with one (1) copy.
☐ 3. Three (3) sets of signed and sealed plans and one (1) set of construction specifications. Specifications may be omitted if approved standard specifications are on file with DHEC. Four (4) sets of plans are required for a combined submittal, if the project includes a wastewater treatment facility.
☐ 4. One (1) set of the appropriate design calculations. WASTEWATER: Design flow (based on R.61-67, Appendix A), pump station calc's. and pump curve. WATER: Recent flow test from a location near the tie-on site, design calc's. indicating pressure maintained in the distribution system during max. instantaneous demand, fire flow and flushing velocities achieved. Number/types of service connections, well record form, pumping test results, etc.
☐ 5. Three (3) copies of a detailed 8½" x 11" location map, separate from the plans.
☐ 6. Two (2) copies of construction easements unless the project owner has the right of eminent domain.
☐ 7. A letter(s) from the entity supplying water and/or providing wastewater treatment stating their willingness and ability to serve the project, (state the flow, number of lots, etc.), including pretreatment permits, if applicable.
☐ 8. A letter(s) from the entity agreeing to be responsible for the operation and maintenance (O&M) of the systems.
☐ 9. Application fee enclosed $ _____. (Refer to Instructions).
☐ 10. WATER SYSTEMS: a) A letter from the local government which has potable water planning authority over the area, if applicable, in which the project is located, stating project consistency with water supply service plan for area.
b) For wells, four (4) copies of a well head protection area inventory.
c) For new wells, a viability demonstration is required in accordance with Regulation 61-58.1.B.(4).

Note: Other approvals may include 208 (wastewater only) and OCRM CZC Certification, and navigable waterway permitting. *To expedite the project review, the 208 and OCRM CZC Certification may be included with the project submittal.*

B) DRP submittal *must* include the following:

☐ 1. A transmittal letter, signed by the professional engineer representing the DRP entity, noting this is a DRP submittal. The letter should state that the project has been reviewed and complies with R.61-58 and/or R.61-67.
☐ 2. The **original** construction permit application, properly completed, with one (1) copy.
☐ 3 Two (2) sets of the signed and sealed plans.
☐ 4. One (1) set of the appropriate design calculations. WASTEWATER: Same information as required under Section XII.A.4. above. WATER: Same information as required under Section XII.A.4. above.
☐ 5. One (1) copy of a detailed 8½" x 11" location map, separate from the plans.
☐ 6. Two (2) copies of construction easements, unless the project owner has the right of eminent domain.
☐ 7. DHEC's OCRM CZC Certification (for water and/or wastewater facilities, in the eight coastal counties).
☐ 8. DHEC's Water Quality permit or conditions for placement in navigable waters, and other Agency approvals.
☐ 9. WASTEWATER SYSTEMS: a) A letter of acceptance from the entity providing the treatment of the wastewater that includes the specific flow and, when applicable, the specific number of lots being accepted.
b) A letter from the organization agreeing to be responsible for the O&M of the wastewater system.
c) The 208 Plan certification from the appropriate Council of Governments (designated 208 areas), or from DHEC on the non-designated 208 areas.
☐ 10. WATER SYSTEMS: A letter from the local government which has potable water planning authority over the area, if applicable, in which the project is located, stating project consistency with water supply service plan for area.
☐ 11. Fee of $75 for water and $75 for wastewater ($150 if combined).

Note: The DRP entity should ensure that a copy of the final approved plans are returned to the design engineer.

XIII. Construction plans, material and construction specifications, the engineering report including supporting design data and calculations are herewith submitted and made a part of this application. I have placed my signature and seal on the engineering documents submitted, signifying that I accept responsibility for the design of this system, and that I have submitted a complete administrative package.

Engineer's Name (Printed): Sam Billin Signature: See Application Package
Registered Professional Engineer
S.C. Registration Number: _____

XIV. Prior to final approval, I will submit a statement certifying that construction is complete and in accordance with the approved plans and specifications, to the best of my knowledge, information and belief. This certification will be based upon periodic observations of construction and a final inspection for design compliance by me or a representative of this office who is under my supervision.

Engineer's Name (Printed): Sam Billin Signature: See Application Package
Registered Professional Engineer
S.C. Registration Number: _____

XV. I hereby make application for a permit to construct the project as described above. I have read this application and agree to the requirements and conditions and agree to the admission of properly authorized persons at all reasonable hours for the purpose of sampling and inspection.

Owner's Name (Printed): Scott McDaniel Signature: [signature]
Owner's Title: Environmental Manager Date: 09/16/2020